

The concealed copulatory structures of the *Pyrgomorphidae*

(Orth. Acridoidea)

PART VI (CONCLUSION). TRIBES *PYRGOMORPHINI* AND *CHROTOGONINI*

BY

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(Láms. II-XIV).

Part I of this study (Kevan, Akbar and Chang, 1969) includes a general discussion of the acridoid male and female structures, with particular reference to the *Pyrgomorphidae*, together with a glossary of terms, including those used herein. Part II (Kevan, Akbar and Chang, 1970) discusses changes in the arrangement of tribes and genera that have been made in the *Pyrgomorphidae* since the preliminary one by Kevan and Akbar (1964) and, together with Parts III, IV and V (Kevan, Akbar and Chang, 1971, 1972, 1974) gives an account of the 28 tribes not dealt with herein. Opportunity is also taken here to present photographs of type material of species for which similar figures have not previously appeared, and which it is not proposed to illustrate elsewhere in connection with generic revisions.

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S E R I E S X.

This series comprises only two tribes, but includes more genera than any other. The genera concerned predominate in Africa, but a few occur also in southern continental Europe and the Mediterranean islands, Madagascar and continental Asia (with Ceylon), well into the Palaearctic region south of about 48° N. They are, however, with one exception (an Indo-Chinese genus of dubious affinities), absent from the whole of southeast Asia from Burma eastwards, from Australia and from the Americas.

The two included tribes differ considerably from one another in general appearance, members of the *Chrotogonini* having depressed (or at least broad) bodies and usually very short fastigia vertices, while those of the *Pyrgomorphini* do not. *Chrotogonini* also differ in that they never show any green coloration (they are always brownish or greyish), whereas *Pyrgomorphini* very frequently do so; the terminal segments of the antennae are incrassated (and fused or partly so) and often pitted, the prosternum has a reflexed, collar-like margin with a double tubercle, the tegmina (when present) have small nodules on the long veins, and the hind wings are hyaline (sometimes faintly bluish) or infumated, but never distinctly coloured. *Pyrgomorphini* are more diverse in appearance and are distinguishable from other *Pyrgomorphidae* on largely negative grounds: they are never very large in size or bulk; the body is not cylindrical nor distinctly depressed or compressed; the fastigium of the vertex is not unusually long or short or very acute; the frontal costa immediately below the fastigium is neither deeply excised nor subvertical in profile; the antennae are neither filiform nor (except in one genus) appreciably specialized and are not inserted far from the lateral ocelli; the pronotum, except in one genus, is not adorned with large tubercles or bosses; the prosternal tubercle is simple, the mesosternal lobes are not divergent posteriorly; the metasternal pits are not open or widely separated; the segments of the hind tarsi are not elongate; and the male cerci are simple.

Although typical *Chrotogonini* and *Pyrgomorphini* are readily distinguishable from each other, the phallic structures have much in common: for example, externolateral expansions are frequently present on the lateral plates of the epiphallus. Also, in external morphology, the chrotogonine genus *Caconda* Bolívar, being more fusiform, super-

ficially suggests, to some extent, a stout, apterous member of the *Pyrgomorphini*; conversely, the anomalous pyrgomorphine genus *Geloiodes* Chopard bears some resemblance to a more fusiform chrotogonine.

TRIBE 29. PYRGOMORPHINI.

(Figs. 1-64; Pl. II-VI).

- [Famille Acridites] Division Truxalides Audinet-Serville, 1838, *Hist. nat. Ins. Orth.* [Coll. suites à Buffon (7)], 565, 578 (*partim*).
- [Geslacht *Acridium* Groepen] *Truxalis*, *Poecilocerus* and *Pyrgomorpha* Haan, 1842, In Temminck, *Verh. natuurl. Gesch. Ned. overz. Bezitt.*, XVIII (Zool. 7), 144 [*Truxalis* only, not p. 146], 145 [not *Truxalis*], 148 [Groep IV, *Pyrgomorpha* only] (all *partim*).
- [Famille des Acridides (*Acrididae*)] *Truxalites* - *Truxalites* Blanchard, 1853, In Hombron et Jacquinet, *Voy. Pôle Sud, Astrolabe et Zélée*, IV, 566 (*partim*).
- [Fam. *Acrididae*] Limited Fam. *Tryxalidae* Walker, 1870, *Cat. Derm. Salt. Brit. Mus.*, III, 494 (*partim*).
- Fam. *Tryxalidae* Walker, 1870, *Zoologist* (2), V, 2298 (*partim*); 1871, *Cat. Derm. Salt. Brit. Mus.*, V (Suppl. 3), 101 (*partim*).
- [Subfam. *Acridinae*] Group *Truxalini* Thomas, 1873, *Rep. U. S. geol. Surv. Terr.*, V (1), 41 (*partim*).
- Zunft der Pyrgomorphiden Brunner von Wattenwyl, 1874, *Verh. zool.-bot. Ges. Wien*, XXIV, 225 (*partim*) [see also Kevan, 1952, *Ent. mon. Mag.*, LXXXVIII, 272, and 1953, *Spec. Pap. Univ. Nottm. Sch. Agric. Zool. Sect.*, I, 2; 1964, *Bull. zool. Nomencl.*, XXI, 379, 381; Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1506].
- Tribus *Pyrgomorphidae* Brunner von Wattenwyl, 1882, *Prodr. europ. Orth.*: xxvii, 78, 85, 184 (? *partim*) [see also Kevan and Akbar, *Canad. Ent.*, XCVI, 1506].
- Pyrgomorphiden Brunner von Wattenwyl, 1882, *Prodr. europ. Orth.*: xxvii, 78.
- Tribu des *Pyrgomorphidae* Finot, 1883, *Orth. France*: 44, 77 (? *partim*).
- Sub-tribu [and "sub-tribu"] *Pyrgomorphae* Bolívar, 1884, *An. Soc. esp. Hist. nat.*, XIII, 20, 23, 419 [see also Kevan, 1964, *Bull. zool. Nomencl.*, XXI, 381; Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1508].
- Tribus *Pyrgomorphii*, Stirps *Pyrgomorpha* Saussure, 1899, *Abh. Senckenb. Naturf. Ges.*, XXI, 644 (*partim*) [no currently included genus referred to].
- Subfam. *Pyrgomorphinae* Kirby, 1902, *Trans. ent. Soc. Lond.*, 1902, 82; Bolívar, 1904, *Bol. Soc. esp. Hist. nat.*, IV, 439.
- Podsemeïstvo *Pyrgomorphini* Yakobson, 1902, In Yakobson and Bianki, *Pryamokr. Lozhnosêchatokr. Ross. Imp.*: 290.

- Subfam. *Poecilocerinae* Bolívar, 1904, *Bol. Soc. esp. Hist. nat.*, IV, 432 (*partim*) [*Stenoscepa*].
- Subfam. *Desmopterinae* Bolívar, 1905, *Bol. Soc. esp. Hist. nat.*, V, 105 (*partim*) [*Arbuscula*].
- Sect. *Pyrgomorphae* Bolívar, 1909, *Gen. Ins.*, XC, 4, 26 [see also Kevan, 1962, *Publ. cult. Diamang.*, LX, 115].
- Sect. *Poeciloceri* Bolívar, 1909, *Gen. Ins.*, XC, 20 (*partim*) [*Stenoscepa*].
- Sect. *Desmopterae* Bolívar, 1909, *Gen. Ins.*, XC, 4, 34 (*partim*) [*Arbuscula*].
- Grupo de las *Pyrgomorpha* [sic] Bolívar, 1918, *Rev. Acad. Cienc. Madrid*, XVI, 392 (*partim*) [see also Kevan, 1964, *Canad. Ent.*, XCVI, 1497 - as *Pyrgomorpha*-group].
- Group *Sphenari* Uvarov, 1937, *J. Linn. Soc. Lond. (Zool.)*, XL, 79, 280 (*partim*) [*Chirindites*].
- Podsemeistvo *Pyrgomorphinae* Tarbinskiĭ, 1940, *Prýg. Pryamokr. Nasek. Azerbaidzh. SSR.*, Moskva, Leningrad, 37, 47.
- Sousfamille *Pyrgomorphinae* Chopard, 1949, *In Grassé, Traité Zool.*, IX, 710 (*partim*) [includes all *Pyrgomorphidae* except *Chrotogonini*].
- Tribe *Sphenariini* Rehn, 1951, *Ent. News*, LXII, 243, 244 (*partim*) [*Chirindites*, ? *Stenoscepa*].
- Tribe *Pyrgomorphini* Kevan, 1953, *Spec. Pap. Univ. Nottm. Sch. Agric. Zool. Sect.*, I, 5; Uvarov, 1953, *Publ. cult. Diamang.*, XXI, 210; Kevan, 1959, *ibid.*, XLIII, 22, 23; Kevan and Knipper, 1959, *Z. Tierpsychol.*, XVI, 278; 1961, *Beitr. Ent.*, XI, 271; Kevan, 1962, *Publ. cult. Diamang.*, LX, 115, 127, 128; 1963, *Nova Guinea* (n. s.), X, 362; Kevan and Akbar, 1963, *Eos*, Madrid, XXXIX, 405, 413; Kevan, 1964, *Canad. Ent.*, XCVI, 1497, 1529; Kevan and Akbar, 1964, *ibid.*: 1509, fig. 3 (map), 1512, 1523, 1526 (*partim*) [included *Sphenexia* now returned to *Sphenariini*]; Akbar, 1966, *Sind Univ. Res. J. (Sci.)*, II, 5; Kevan and Akbar, 1966, *Acrid. Abstr.*, MCMLXVI, 14; Kevan, 1968, *Proc. R. ent. Soc. Lond. (B)*, XXXVII, 162; Kevan, Akbar and Chang, 1969, *Eos*, Madrid, XLIV (1968), 193, 196; 1970, *ibid.*, XLV (1969), 174, 176, 177; Dirsh, 1970, *Ann. Mus. R. Afr. Centr.*, in-8° (Zool.) CLXXXII, 67, 68; Kevan, 1970, *Rev. suisse Zool.*, LXXVII, 851 & alt. p. heads 853-863; Akbar, 1971, *Sind Univ. Res. J. (Sci.)*, V, 93.
- Podčeled' *Pyrgomorphinae* Obenberger, 1955, *Entomologie*, Praha, II, 329 (*partim*) [includes all *Pyrgomorphidae* (as well as non-pyrgomorphids) except *Chrotogonini*].
- Group *Pyrgomorphae* Johnston, 1956, *Annot. Cat. Afr. Grassh.*: 167 (*partim*).
- Tribe *Phymellini* Kevan, 1959, *Publ. cult. Diamang.*, XLIII, 22, 23 [see also Kevan and Akbar, 1963, *Eos*, Madrid, XXXIX, 413; 1964, *Canad. Ent.*, XCVI, 1512].
- Tribus *Pyrgomorphini* Weidner, 1962, *Abh. Verh. naturwiss. Ver. Hamburg* (N. S.), VI, 89.

The above bibliographic references include only those names applicable to the tribe *Pyrgomorphini* in its current sense, and not to the *Pyrgomorphidae* as a whole. Two of the early names may indeed fall in the latter category, but, as the only genus mentioned is *Pyrgomorpha* Audinet-Serville, it is unknown whether the author placed a restricted or wide interpretation on the name. At the time, *Phymateidae* (or its equivalent) was also in use for the whole family. Conversely, Brunner von Wattenwyl (1893: 103, 130; 1898: 196, 197, 198, 199, 233 — Tribus *Pyrgomorphidae*), Perrier (1893: 1238 — Trib. *Pyrgomorphinae*), Finot (1896: 402, 488, 489 — Tribu *Pyrgomorphidae*), Saussure (1899: 637 — Tribus *Pyrgomorphii*), and Azam (1901: 36 — Tribus *Pyrgomorphinae*) employed equivalent terms to 'tribe', and Shiraki (1910: 49 [not 1, 2]) used "Subf. *Pyrgomorphini*" (i. e. with a modern 'tribial' termination), but these usages embraced the whole family. The references, therefore, are not included in the above synonymy.

External features: Body never very large, often quite small for the family, fusiform to elongate-fusiform, not, or scarcely, depressed; integument not usually (though occasionally) strongly rugose, without longitudinal plicate tubercles (rarely with plicate striae) and only rarely with enlarged tubercles of other form; coloration very diverse, from sombre to bright, often predominantly green; antennae triquetrous or slightly depressed at base, terminal segments not noticeably incrassated or pitted; head conical, frontal profile fairly to very strongly oblique, often excavated, fastigium of vertex usually of moderate length, not very acute; pronotum not exceptionally widened distad in dorsal view, lateral carinae present or absent on disc; sternal lamina not especially wide, prosternum without a reflexed, collar-like anterior margin, prosternal tubercle simple, mesosternal lobes with interspace usually at least as wide as a lobe, not divergent distad; tegmina and hind wings very variable in degree of development, frequently greatly reduced or lacking, longitudinal veins of tegmina without distinct nodules, hind wings when developed, hyaline or variously pigmented, seldom entirely infumated, often brightly coloured (red, violet, yellow) or rosy at base; male cerci simple.

Principal phallic characters: Epiphallus of conventional form, varying considerably in shape but seldom notably transverse, bridge of variable width but never exceptionally broad or narrow, lateral plates usually short and wide at base, with or without externolateral expansions, latter often very prominent and acutely pointed, lophi of

variable length but usually rather short (occasionally longer), dorsolaterally or laterally directed; ectophallus broadly pyriform or subpyriform, central membrane of variable extent but usually small, V- or Y-shaped or triangular, zygoma broad and simple, very often occupying the greater part of the dorsum of the cingulum and usually with posterior margin produced, occasionally broadly convex, suprazygomal plate rarely lacking, when present, at least as wide as the basal thickening of the cingulum, varying from broadly rounded to tongue-like, posterior margin rounded, truncated or slightly emarginate, never longer and usually much shorter than the zygoma, basal emargination of cingulum variable in form but usually shallow or quite small, varying from V-shaped to semicircular, apodemal plates in lateral view rounded or bluntly pointed with never more than a hint of ventral processes, valves of cingulum variably developed, finger-like, sometimes very small or absent, rami of cingulum in dorsal view variable in width but frequently quite broad, not usually strongly convergent, suprarami variably developed, sometimes rather large, supraramal inflections, when present, also variable, often curved forward, sheaths most often poorly developed although sometimes of moderate size, ventral process of cingulum of varying shape, usually short and triangular but often longer and narrower or with rounded apex; aedeagal sclerites generally comparatively short and fairly stout, endophallic apodemes variable, sometimes dorsoventrally flattened, but, when not so, usually rounded anteriorly in profile and often dorsally produced posteriorly, ventral processes lacking or only feebly indicated, dorsal inflections varying from very large and almost foliaceous to virtually absent, spermatophore sac large or of moderate size, spherical, elongate-oval or transversely ovoid, occasionally pyriform or of other shape, gonopore behind the middle or near to it, never in front of it, phallotreme duct occasionally enlarged anteriorly, pseudoarch small to indistinct, aedeagal valves most commonly rather small, short and simply conical but occasionally fairly long, frequently pouched ventrally to receive the apices of the 'aedeagal sclerites', part of valve beyond pouch sometimes narrower and sinuous or upwardly curved.

Concealed female structures: Subgenital plate with posterior edge transverse, rounded, or biarcuate (rarely excavated), serrated or crenulated or rather smooth, egg-guide triangular but of variable width and prominence, usually rather acute, contact areas sometimes indicated in front of the posterior edge but never well developed, colu-

mellae of variable development or lacking; spermatheca S- or G-shaped, occasionally more elongate, with or without an apical pocket, caecum in diameter about equal to or wider than the anterior part of the spermathecal vesicle, traces of spermathecal appendage in the form of a small apical bulb occasionally present at the apex of the caecum; spermathecal duct very variable in length with at most only a small terminal dilation (except in *Lepteia* Bolívar where it is long and distinct).

Distribution: All Africa including the offshore islands and Sokotra, Madagascar, southern continental Europe and the Mediterranean islands, continental Asia from the Mediterranean as far east as India in the south and across the central part of the continent as far as Mongolia in the north; represented also by a single anomalous genus (conceivably not belonging to the tribe) in Indo-China. One fossil genus from the Miocene of central Europe seems to belong to the tribe also.

Four subtribes are here recognized, although Kevan and Akbar (1964) include only two besides the *Sphenexiina*, which have now been transferred to the *Sphenariini*. Some of the characters differentiating these two subtribes are given by Kevan (1966). The new subtribes are erected to accommodate the little-known anomalous genera *Arbuscula* Bolívar and *Geloiodes* Chopard. The first of these outwardly somewhat resembles *Anarchita* Bolívar (*Pyrgomorphina*), but it is so isolated geographically from other members of the tribe, and its concealed copulatory structures (and antennae) show such differences that it would seem best to place it in a separate subtribe. *Geloiodes*, which is known only by females, is also atypical in its external morphology and spermatheca, so that it, too, is placed in a separate subtribe, pending the discovery of the male. Whether the Miocene genus *Miopyrgomorpha* Kevan really belongs to the *Pyrgomorphina* is not possible to determine, but it is best left in that subtribe for the present.

Subtribe a. PYRGOMORPHINA.

(Figs. 1-48; Pl. II-VI).

Pyrgomorphini (*partim*): References given above in bibliography of tribal nomenclature, except for the names based on *Desmoptera* and *Sphenarium*, but including those based on *Poekilocerus*.

Subtribe *Pyrgomorphina* Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1509, fig. 3 (map), 1524, 1526 (*partim*) [*Arbuscula* and *Geloiodes* now

removed to separate subtribes]; Kevan, 1964, *ibid.*, XCVI, 1529, Kevan, 1966, *Proc. R. ent. Soc. London* (B), XXXV, 84 [error] = 90; Kevan, Akbar and Chang, 1969, *Eos*, Madrid, XLIV (1968), 176, 196, 230; 1970, *ibid.*, XLV (1969), 177.

External features: Body distinctly fusiform or elongate-fusiform, not compressed or depressed; integument usually at least somewhat rugose; colour often green but very frequently brownish or greyish, sometimes with yellow and black markings but usually lacking red; antennae slightly flattened at base; vertex often strongly arched dorsally in profile, frontal profile frequently unevenly and strongly excavated in lateral view, fastigium of vertex of moderate length or rather short; lateral carinae of pronotum usually present, lateral pronotal lobe usually with an oblique ridge; tegmina and hind wings varying from fully developed to entirely absent, latter, if present, often brightly coloured.

Principal phallic characters: Epiphallus with prominent, wide, external lateral expansions which are generally acutely pointed or at least right-angled, only rarely obtuse (*Laufferia*, some *Zarytes*) or not angled (*Pyrgomorphula*), lophi directed laterally or distinctly laterodorsally; ectophallus with central membrane usually Y-shaped, triangular, or transverse, rarely V-shaped (*Pyrgomorphula*), posterior margin of zygoma broadly rounded, rarely emarginate, subtruncate or produced (*Pyrgomorphula*), suprazygomal plate (if present) usually very broadly rounded posteriorly, basal emargination of variable size; endophallic apodemes usually without prominent dorsal inflections, which, if present, are not produced backwards, aedeagal valves very commonly with a ventrolateral process or pocket receiving the apices of the 'aedeagal sclerites'.

Concealed female structures: Subgenital plate with discrete columnellae (except in *Plerisca*, in which the posterior edge is very strongly emarginate); spermatheca simple S- or G-shaped, with or without an apical pocket, apex of caecum not curved inwards nor with a distinct vestigial appendage.

Distribution: The whole range for the tribe, except Indo-China.

Included genera: *Ochrophlebia* Stål, 1873; *Ochrophlegma* Bolívar, 1904; *Laufferia* Bolívar, 1904; *Scabropyrgus* Kevan, 1962; *Tanita* Bolívar, 1904; *Tanitella* Kevan, 1962; *Plerisca* Bolívar, 1904; *Punctisphena* Kevan, 1961; *Carinisphena* Kevan, 1966 [only female known]; *Protanita* Kevan, 1962; *Macroleptea* Kevan, 1962; *Pyrgo-*

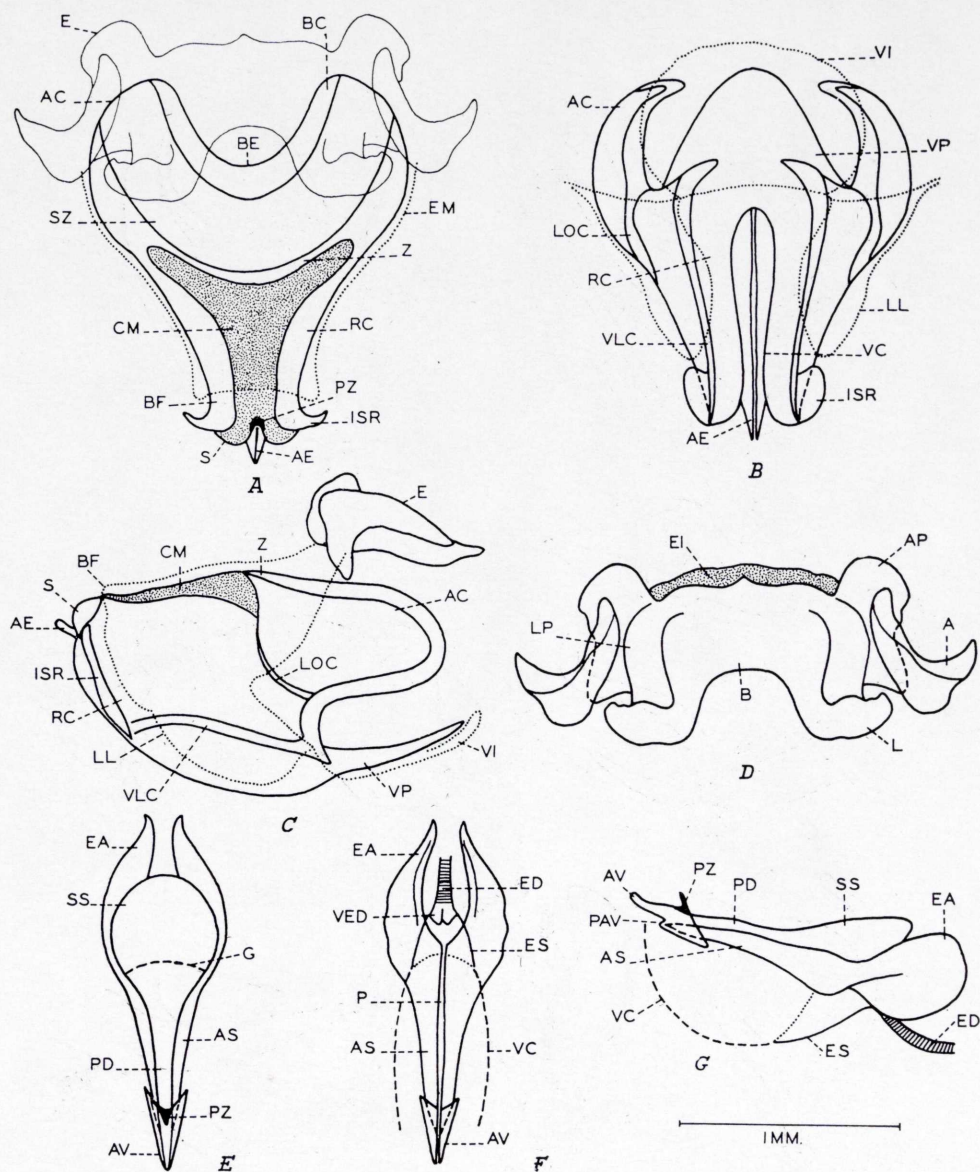


Fig. 1.—*Pyrgomorphini* (*Pyrgomorphina*): *Ochrophlebia cafra cafra* (Linnaeus), phallic structures. *A*, phallic complex, dorsal; *B*, the same, ventral; *C*, the same, from the right; *D*, epiphallus, dorsal; *E*, endophallus, dorsal; *F*, the same, ventral; *G*, the same, from the right. For notation, see pp. 199-201.

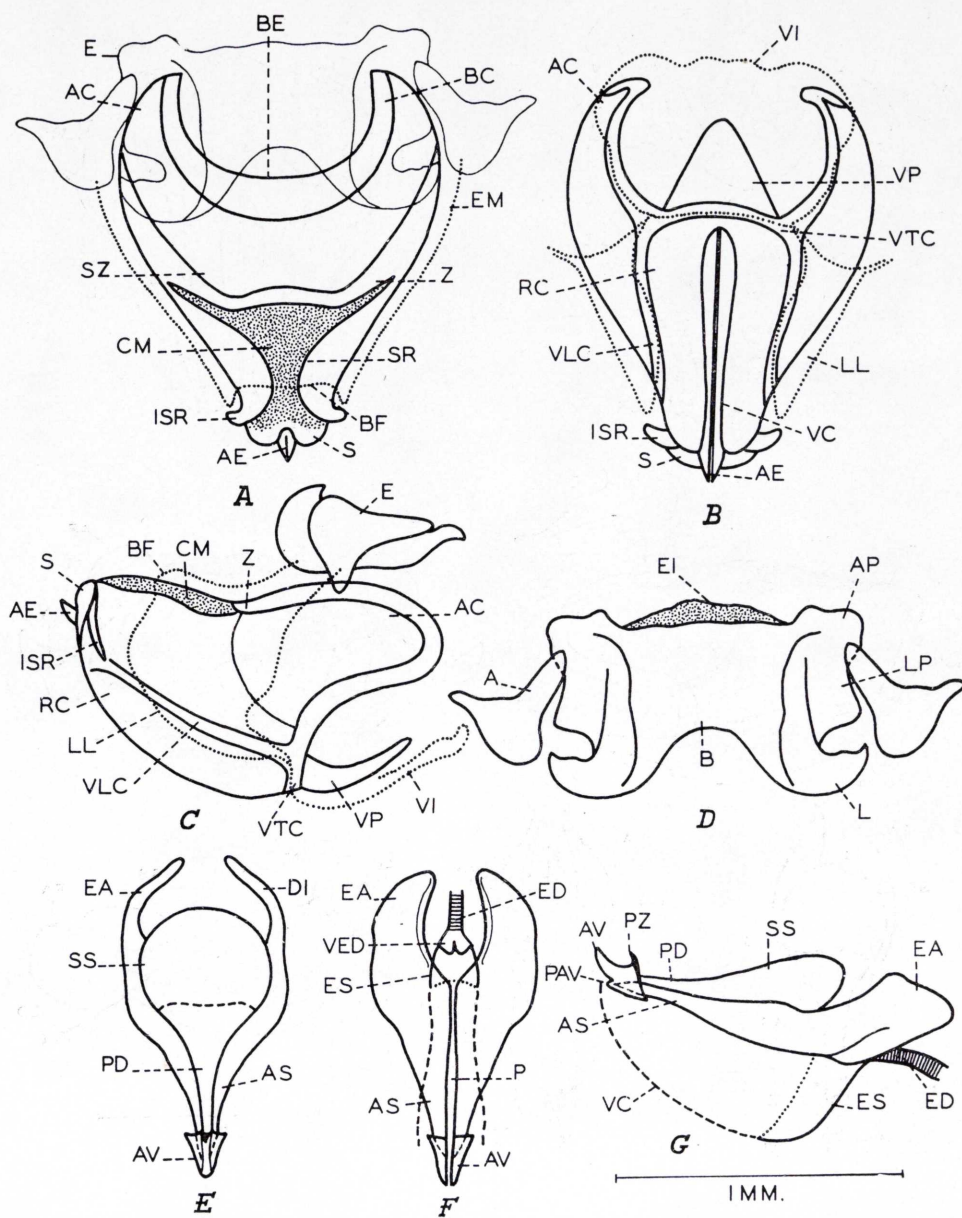


Fig. 2.—*Pyrgomorphini* (*Pyrgomorphina*): *Ochrophlegma pygmaea* (Karsch), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.

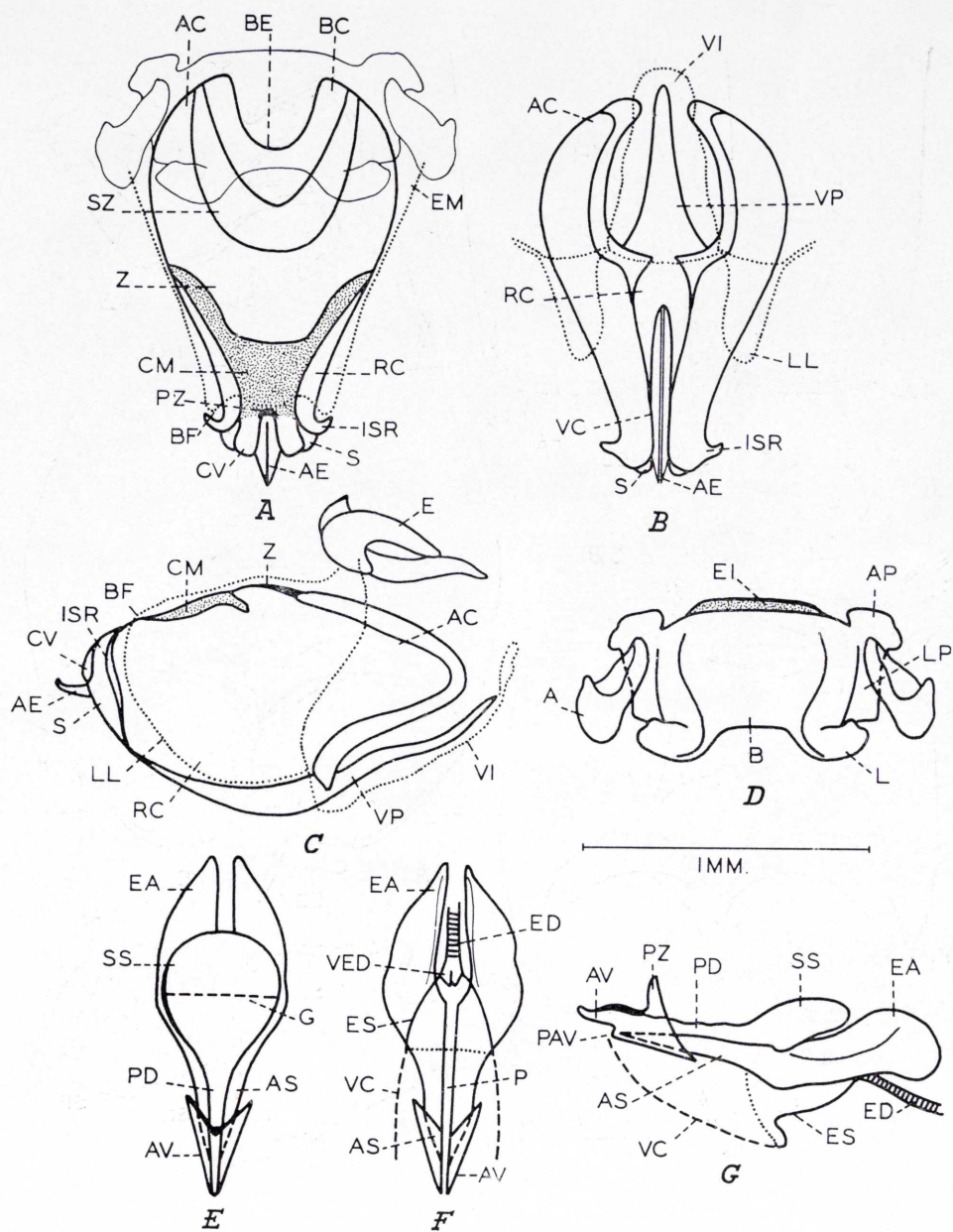
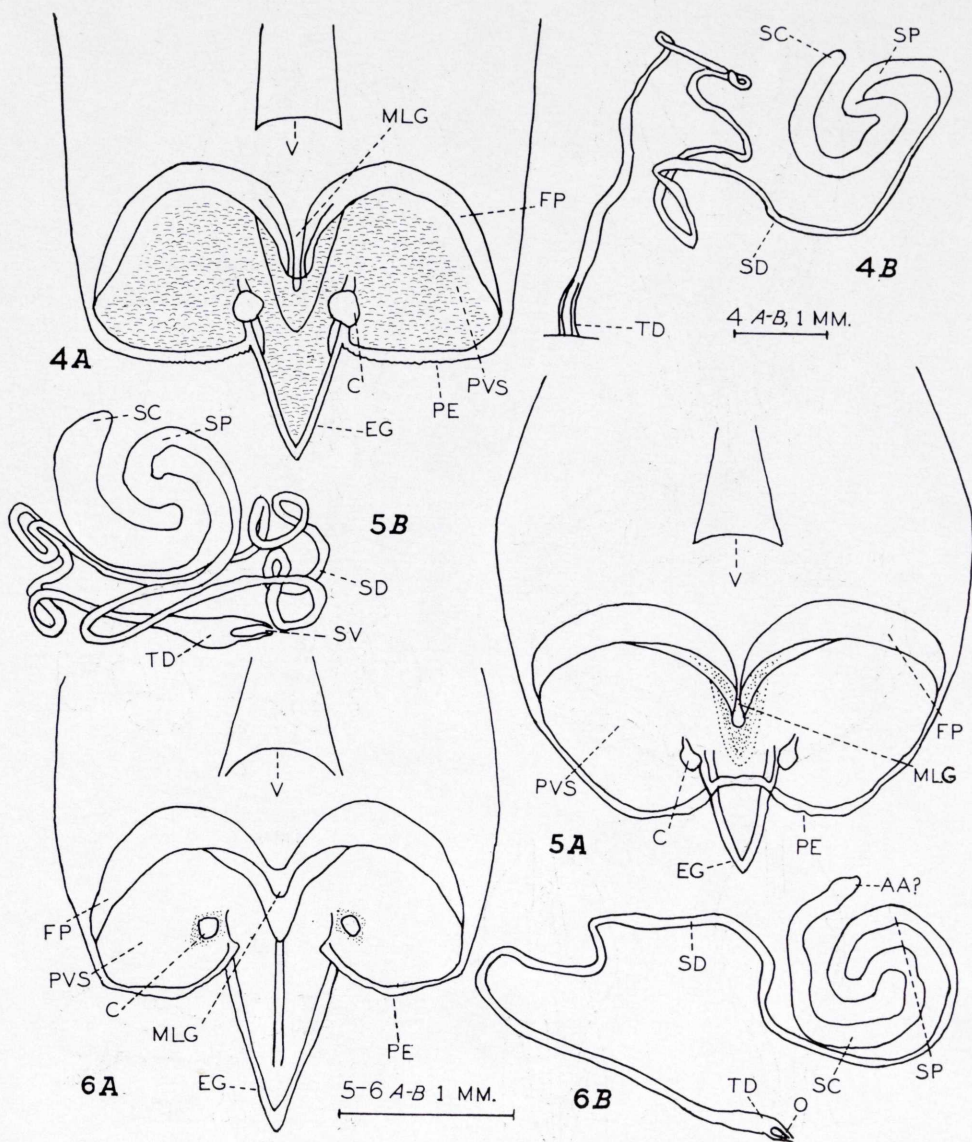


Fig. 3.—*Pyrgomorphini* (*Pyrgomorphina*): *Laufferia chloronota* (Bolívar), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.



Figs. 4-6.—*Pyrgomorphini* (*Pyrgomorphina*), female structures: 4) *Ochromphlebia cafra cafra* (Linnaeus); 5) *Ochromphlegma vittifera* (Walker); 6) *Laufferia chlo-ronota* (Bolivar). A, subgenital plate, dorsal; B, receptaculum seminis. For notation, see pp. 199-201.

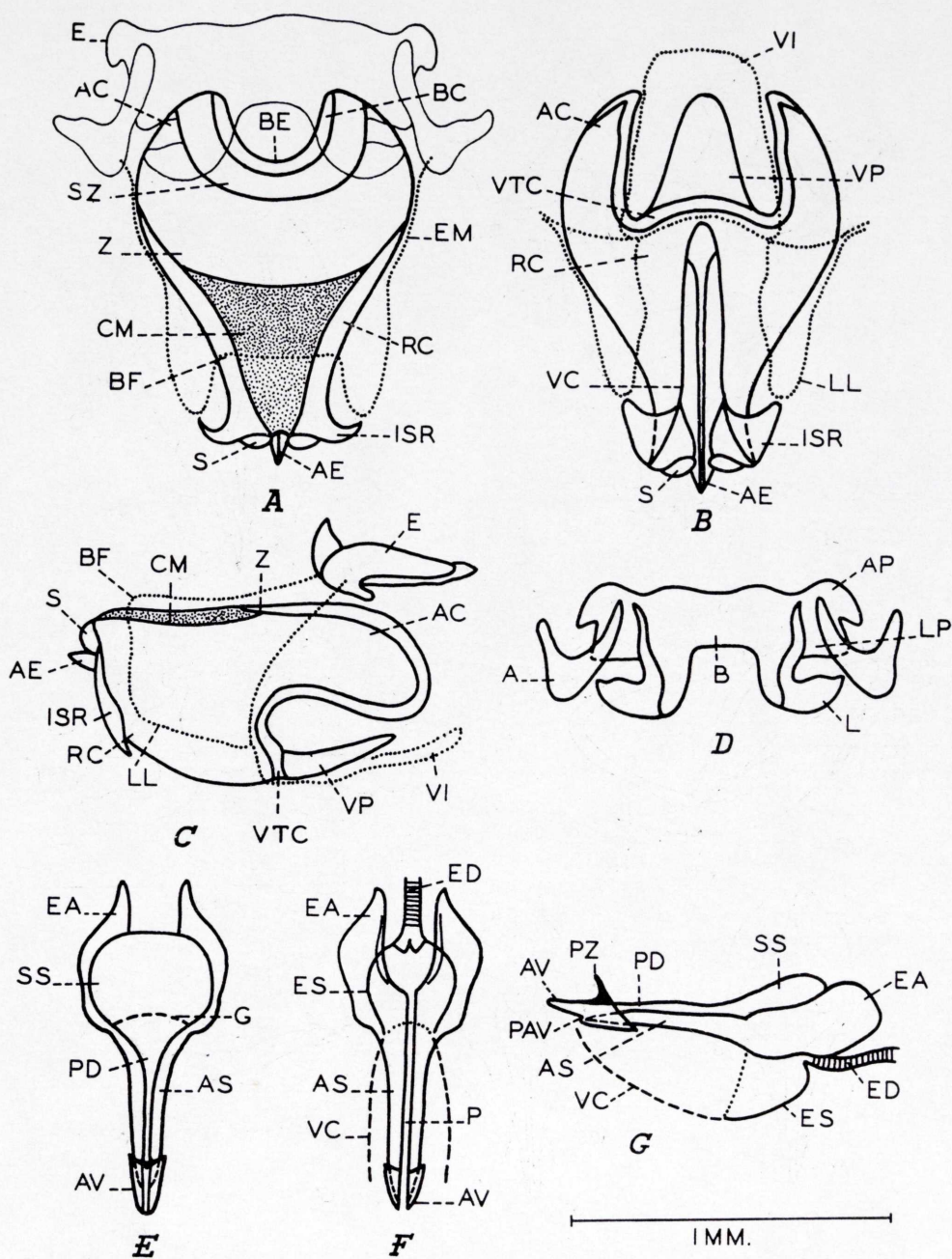


Fig. 7.—*Pyrgomorphini* (*Pyrgomorphina*): *Scabropyrgus scabrosus* (Bolívar), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.

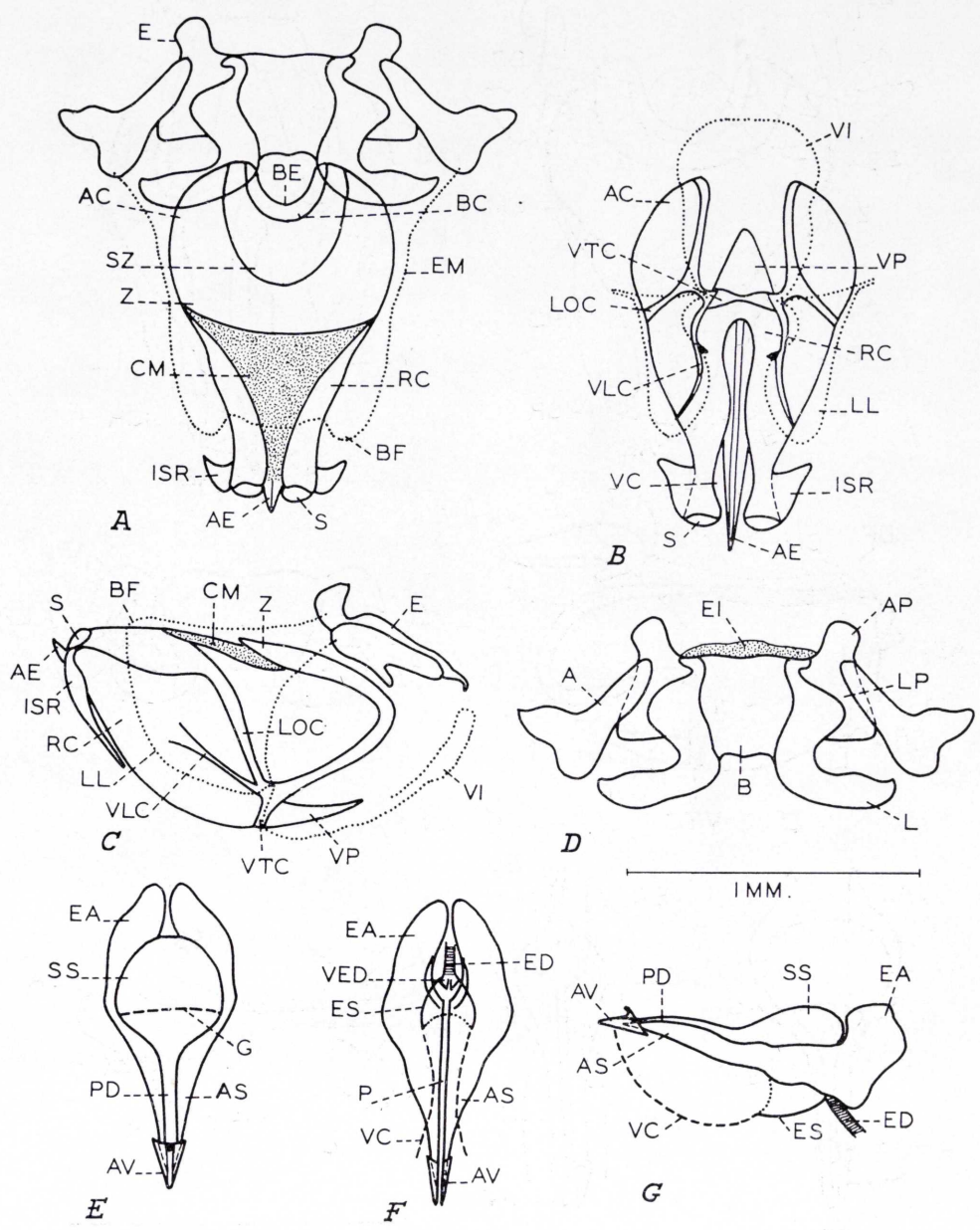


Fig. 8.—*Pyrgomorphini* (*Pyrgomorphina*): *Tanita subcylindrica* (Bolívar), phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.

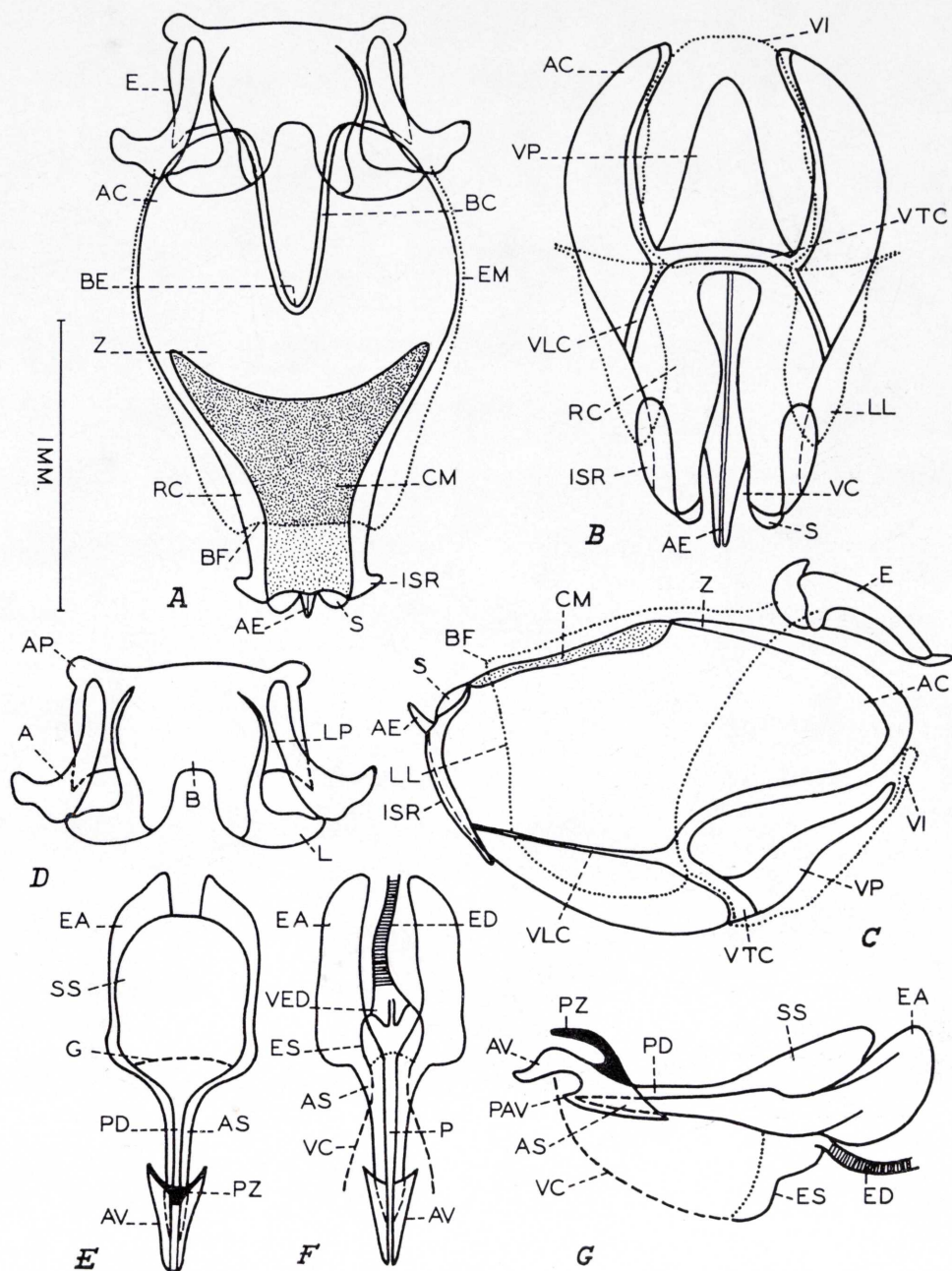
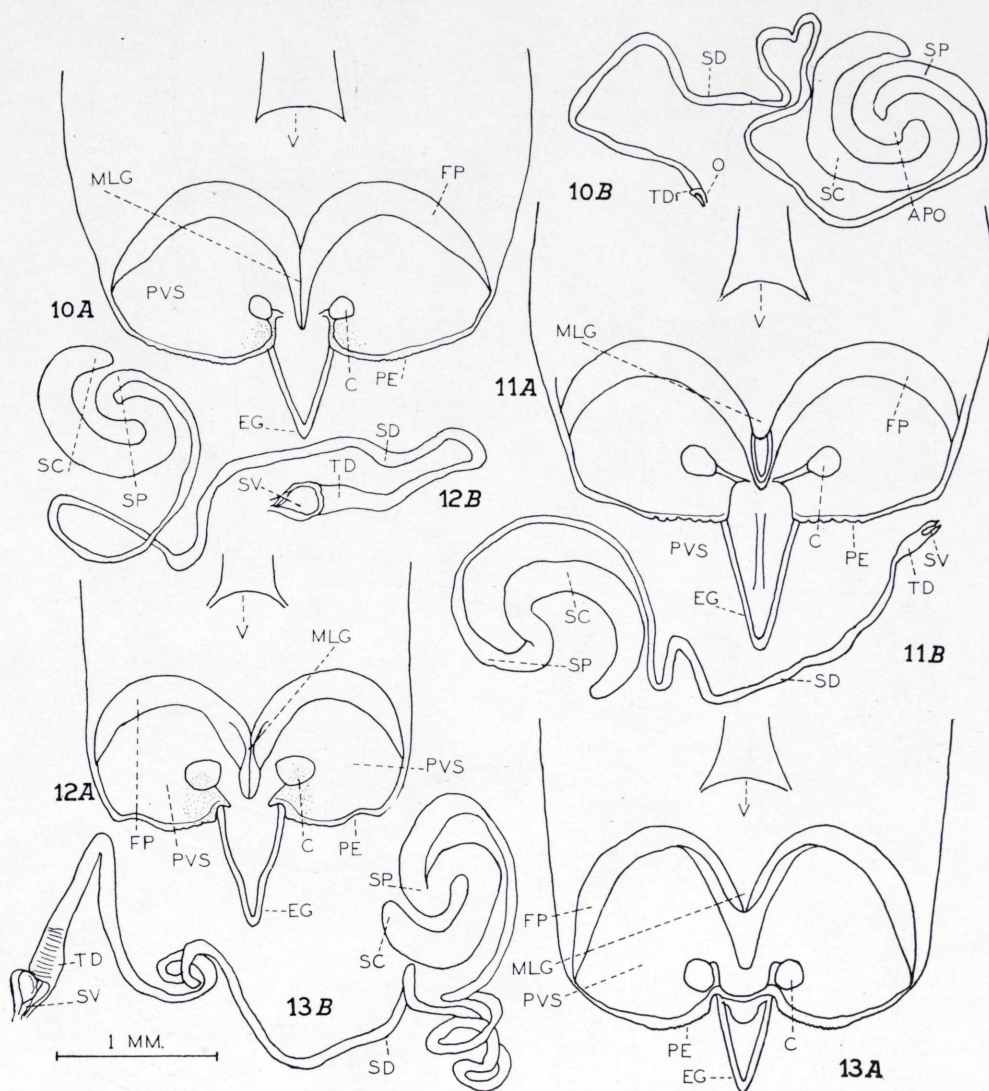


Fig. 9.—*Pyrgomorphini* (*Pyrgomorphina*): *Tanitella prasina* (Karsch, 1888), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.



Figs. 10-13.—*Pyrgomorphini* (*Pyrgomorphina*), female structures: 10) *Scabropyrgus scabrosus* (Bolivar); 11) *Tanita lineaalba* Bolívar; 12) *T. breviceps* (Bolivar); 13) *Tanitella prasina* (Karsch). A, B as in Figs. 4-6. For notation, see pp. 199-201.

morpha Audinet-Serville, 1838; *Somalopyrgus* Kevan, 1964; *Pyrgomorphella* Bolívar, 1904; *Phymelloides* Kevan and Akbar, 1964; *Phymella* Uvarov, 1922; *Anarchita* Bolívar, 1904; *Zarytes* Bolívar, 1904; *Leptea* Bolívar, 1904; *Pyrgomorphula* Kevan and Akbar, 1964; *Miopyrgomorpha* Kevan, 1964 [fossil only].

Species examined: *Ochrophlebia cafra cafra*³ (Linnaeus, 1764) (SW. and S. of South Africa — Figs. 1, 4); *O. c. ligneola* (Audinet-Serville, 1838) (most of southern Africa except SW. of South Africa) [Type species]⁴; *Ochrophlegma vittifera* (Walker, 1871) (Transvaal to eastern S. Africa — Fig. 5) [Type species]; *O. pygmaea* (Karsch, 1888) [possibly only a brachypterous form of *O. violacea* (Stål, 1876)] (Mozambique — Fig. 2); *Laufferia chloronota* (Bolívar, 1889) (Angola — Figs. 3, 6) [Type species]; *Scabropyrgus scabrosus* (Bolívar, 1889) (Angola — Figs. 7, 10) [Type species]; *Tanita loosi loosi* Bolívar, 1904 (NW., N., NE. and E. Zaïre Republic to Katanga, SW. Tanzania, W. Zambia); *T. l. pulchra* Kevan, 1962 (C. and SW. Zaïre Republic, Angola); *T. lineaalba* (Bolívar, 1889) [not regarded as synonymous with the next, cf. Dirsh (1966, 1970)] (Angola, Zaïre Republic, Zambia — Fig. 11); *T. subcylindrica subcylindrica* (Bolívar, 1882) (Congo and Zaïre Republics, Angola, Zambia, SW. Tanzania — Fig. 8); *T. brachyptera* Bolívar, 1912 [? = brachypterous form of last; not a *Pyrgomorpha* (cf. Kevan, 1962b), thus = *P. neavei* Kevan, 1962 — **syn. nov.**] (S. Katanga, Zambia, SW. Tanzania); *T. stulta* Bolívar, 1912 [= *obesa* Uvarov, 1953] (S. Katanga to SE. Angola); *T. parva parva* Kevan, 1962 [not regarded as synonymous with the next, cf. Dirsh (1966, 1970)] (NW. Tanzania, ? S. Uganda and SW. Kenya); *T. p. violacea* Kevan, 1962 (S. Sudan to W. Africa); *T. breviceps* (Bolívar, 1882) (Angola, Zaïre Republic) [Type species]; *Tanitella prasina* (Karsch, 1888) (South Africa — Figs. 9, 13) [Type species]; *Plerisca rubripennulis* (Key, 1937) [? = *peringueyi* Bolívar — listed with “other species” below] (S. Cape Province — Figs. 14, 17; Pl. II, figs. A, B); *Punctisphenia pustulata* Ke-

³ Kevan (1962a) explains the use of this spelling. Dirsh (1966) reverts to the original Linnaeus spelling “*cafer*” without giving reasons for rejecting the view that the name was adjectival and thus should change spelling with the gender of the generic name with which it is associated.

⁴ We do not regard *lignicola* as an absolute synonym of *cafra* as does Dirsh (1966), but as a geographical subspecies, although perhaps not always well defined.

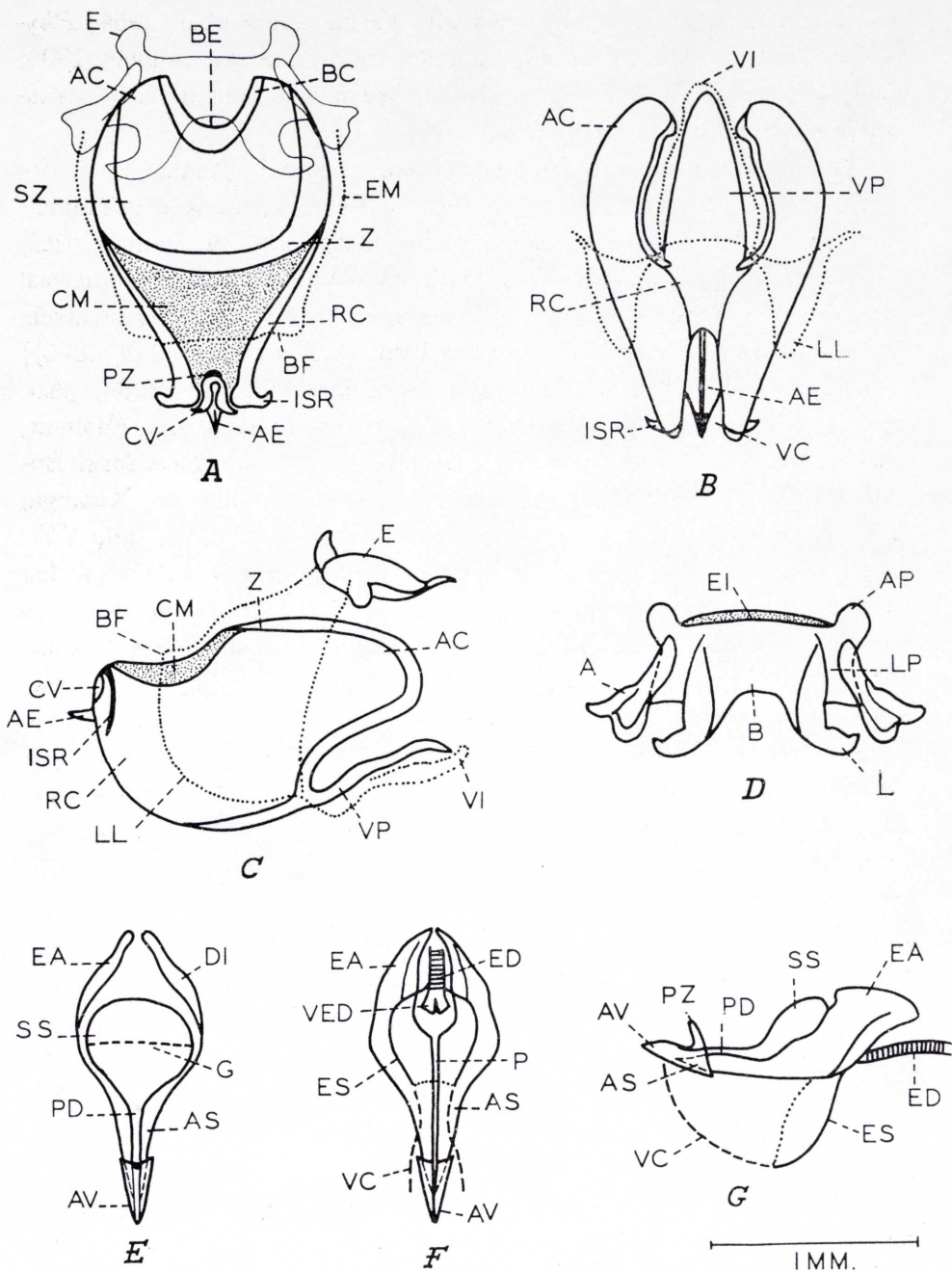


Fig. 14.—*Pyrgomorphini* (*Pyrgomorphina*): *Plerisca rubripennulis* (Key), phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.

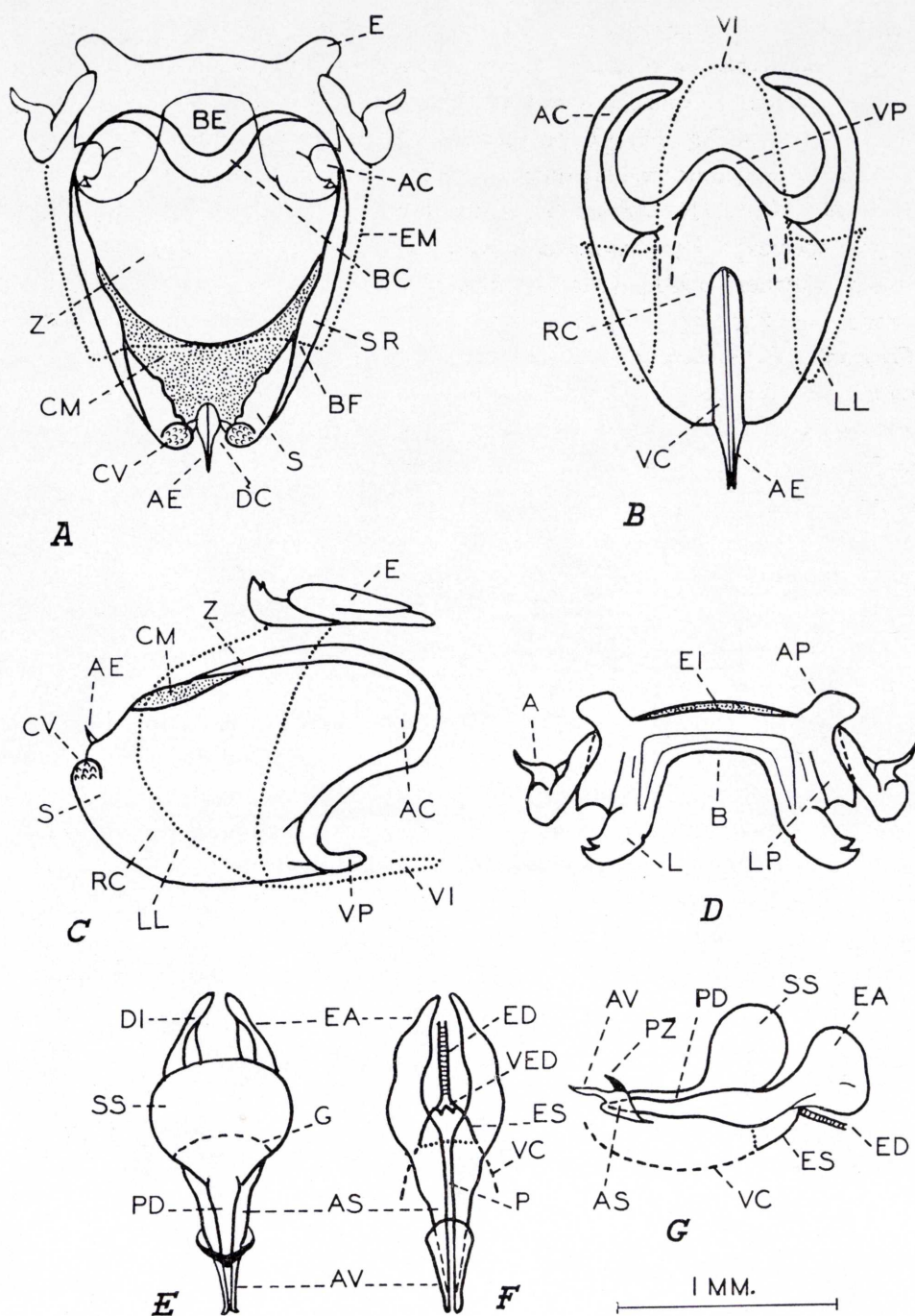


Fig. 15.—*Pyrgomorphini* (*Pyrgomorphina*): *Punctisphena pustulata* Kevan, phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.

van, 1961 (SE. Rhodesia, N. Transvaal — Figs. 15, 18) [Type species]; *Carinisphena producta* Kevan, 1966 (E. Transvaal — Fig. 19) [Type species]; *Protanita elongata* (Bolívar, 1912) (Katanga, W. Zambia, Angola — Fig. 16) [Type species]; *P. fusiformis* (Sjöstedt, 1929) (E. Zaïre Republic to Uganda — Fig. 20); *Macroleptea laevigata* (Werner, 1914) (N. Africa to Israel and ? Jordan — Figs. 21, 23) [Type species]; *Pyrgomorpha conica conica* (Olivier, 1791) [= *mideltica* Werner, 1931] (Mediterranean region, *sensu lato* — except Cyprus — Fig. 22) [Type species]⁵; *P. c. pyrga* Steinmann, 1967 (Cyprus); *P. c. tereticornis* (Brullé, 1838), *sensu lato* [= *cognata*, *auctt.*, *nec* Krauss (*partim*)] (Canary Is. [*s. str.*], Cape Verde Is., arid parts of Africa and SW. Asia. — Fig. 25); *P. c. fusca* (Palisot de Beauvois, 1807) (coastal zone of W. Africa to C. Africa); *P. conica*, n. ssp. (Abdelkuri I.); *P. cognata* Krauss, 1877 (Senegal to NE. Africa, and possibly W. Arabia); *P. bispinosa bispinosa* Walker, 1870 [= *cingulata* (Walker, 1870) = *indica* Bolívar, 1902] (peninsular India); *P. b. deserti* Beï-Bienko, 1951 [= *P. conica deserti*, *auctt.*] (Pakistan to C. and SW. Asia and westwards [? new subsp. = *P. cognata*, *auctt.*, *partim*] to Senegal); *P. b. mongolica* (Sjöstedt, 1933) [= *P. conica mongolica*, *auctt.* = *P. kazakhstanica* Steinmann, 1967] (E. Kazakhstan, N. Sinkiang, Mongolia); *P. maculifemur* Kevan, 1968, now seems to be subspecies of *P. cognata* (Tchad, S. Sahara); *P. cypria* Bolívar in Azam, 1901 [= *cyprica* Steinmann, 1967] (Cyprus); *P. vosseleri* Uvarov, 1923 [possibly fully macropterous form of next] (N. Algeria); *P. agarena* Bolívar, 1884 [= *miniata* Bolívar, 1914 — macropterous form with shorter hind wings] (N. Morocco); *P. maruxina* Bolívar, 1908 (Ifni to SW. Morocco) [= *maruxina ifniensis* Bolívar, 1936, syn. nov.]; *P. candidina* Bolívar, 1908 (W. Morocco) [almost certainly only a small form of *maruxina*]; *P. lepineyi lepineyi* Chopard, 1943 (Grand Atlas Mts.); *P. l. montigena* Chopard, 1943, stat. nov. (Middle Atlas Mts.); *P. lepineyi*, n. ssp. (E. Atlas Mts.); *P. tricarinata* Bolívar, 1884 [= *pro-cera* Bolívar, 1908 = *acutegeniculata* Bolívar, 1908] (NW. Morocco); *P. guentheri* Burr, 1899 [= *brevipennis* Bolívar, 1904 = *predetshenskii* (Beï-Bienko, 1951) = *ozeqi* Karabağ, 1953] (Syria, Anatolia, NW. Iran, Caucasus); *P. hemiptera* Uvarov, 1938 (S. Arabia);

⁵ The group of species and subspecies including *P. conica*, *P. bispinosa* and *P. cognata* is taxonomically very difficult and has not yet been fully elucidated. Some preliminary clarification is provided by Kevan (1970, 1971, 1973).

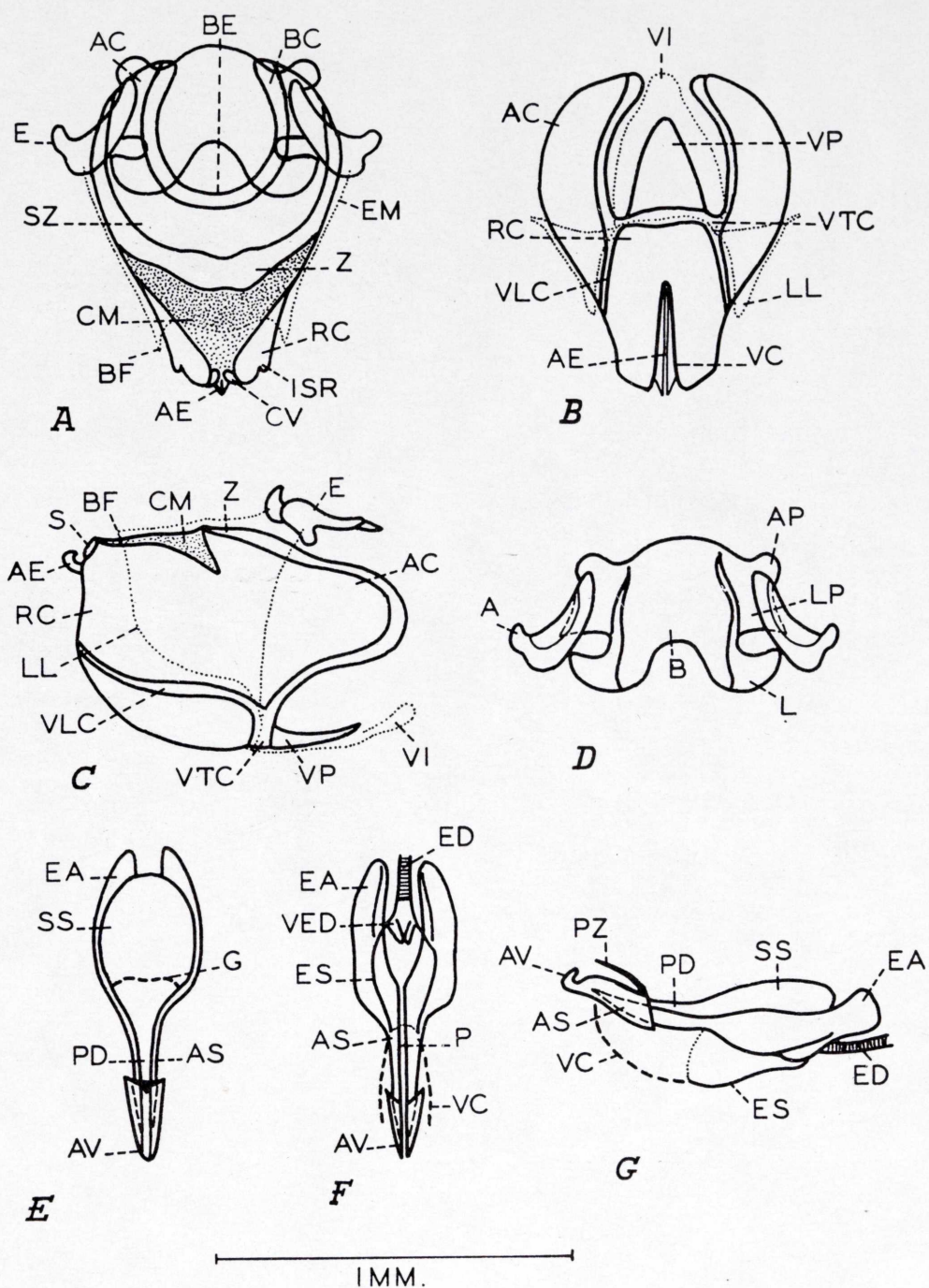
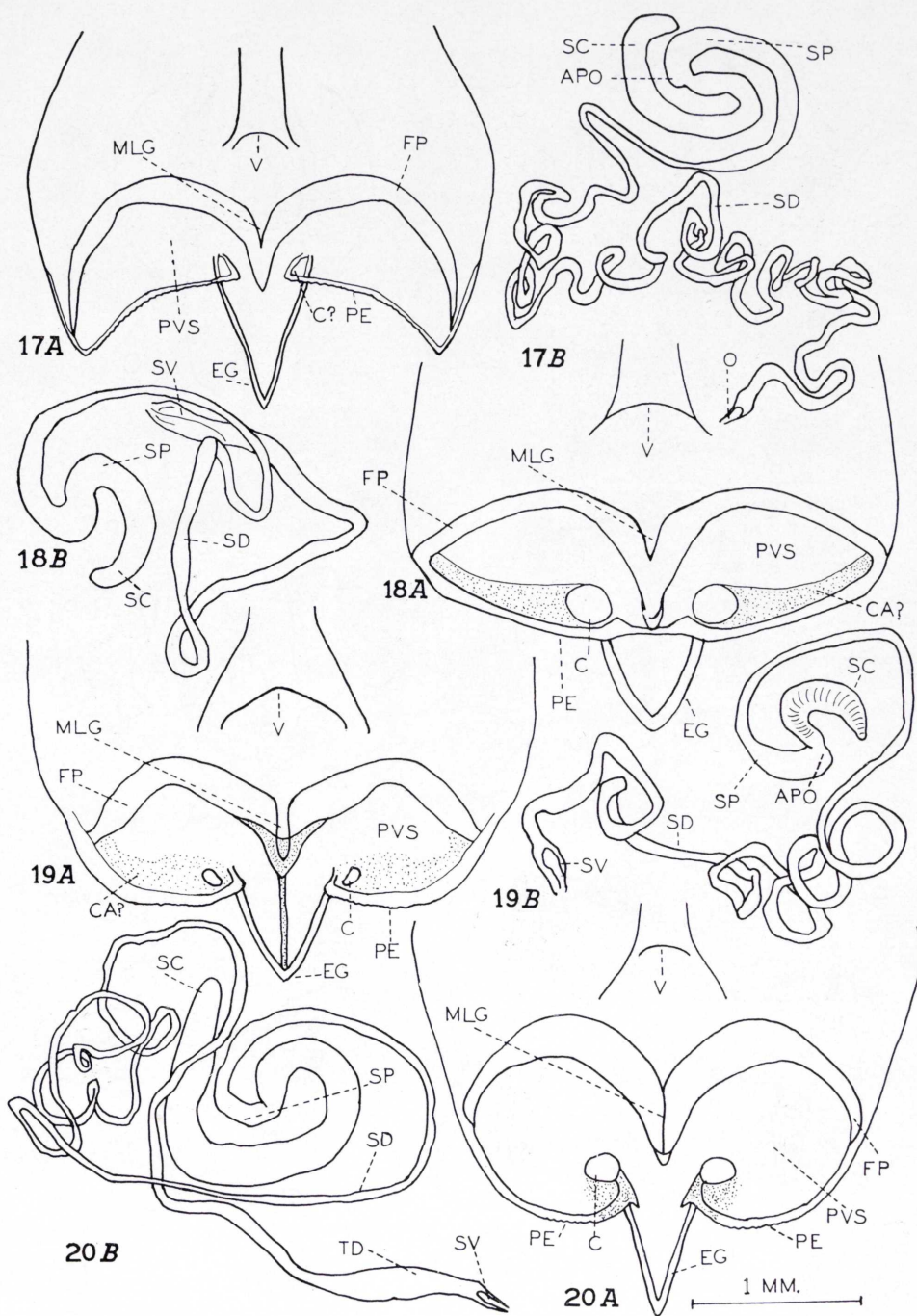


Fig. 16.—*Pyrgomorphini* (*Pyrgomorphina*): *Protanita elongata* (Bolivar), phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.



Figs. 17-20.—*Pyrgomorphini* (*Pyrgomorphina*), female structures: 17) *Plerisca rubripennulalis* (Key); 18) *Punctisphena pustulata* Kevan; 19) *Carinisphena producta* Kevan, holotype; 20) *Protanita fusiformis* (Sjöstedt). A, B, as in Figs. 4-6. For notation, see pp. 199-201.

P. minima Uvarov, 1943 [? a small subsp. of *P. cognata*, s. str.] (NW. Oases of Egypt); *P. minuta* Kevan, 1963 (Cape of Good Hope); *P. inaequalipennis* Bolívar, 1904 (W. Himalaya); *P. granulata* Stål, 1875 [= *cylindrica* Bolívar, 1904, not *sanderi* Krauss, 1901] (drier parts of equatorial Africa except NE., southern Africa except Cape); *P. angolensis* Bolívar, 1889 [erroneously synonymized with last by Dirsh (1966) — ? new genus⁶] (Angola, SW. Africa); *P. vignaudii vignaudii* (Guérin-Méneville, 1849) [= *dispar* Bolívar, 1884 = *kraussi* Uvarov, 1926] (Senegal to Ethiopia); *P. v. semlikiana* (Rehn, 1914) [= *dispar* (Miller, 1929) = *milleri* Uvarov, 1953] (C. and equatorial E. Africa); *Pyrgomorpha* n. sp. (S. Africa); *Somalopyrgus rotundipennis* Kevan, 1964 (Somalia — Figs. 27, 28; Pl. II, figs. G-J) [Type species]; *Pyrgomorphella sphenarioides* Bolívar, 1904 (Eritrea — Figs. 29, 30; Pl. II, figs. K, L) [Type species]; *P. albin* (Chopard, 1921) (E. Africa) — Pl. III, figs. A-D); *P. arachidis* Dirsh, 1951 (E. Africa — Pl. III, figs. E, F); *P. granosa* (Stål, 1876) (Israel, Lebanon, Syria, Jordan); *P. rotundata* Uvarov, 1935 (S. Arabia — Pl. III, figs. K, L); *P. madecassa* Bolívar, 1904 (C. Madagascar — Fig. 31; Pl. IV, figs. A-D); *P. tulearensis* Descamps et Wintrebert, 1966 (SW. Madagascar — Fig. 32; Pl. IV, figs. E-H); *P. dichrosta-chyae* Descamps et Wintrebert, 1966 (S. Madagascar — Fig. 33; Pl. IV, figs. I-L); *P. minuta* Dirsh, 1963 (SSW. Madagascar — Pl. IV, figs. M-P); *Phymelloides rugosus* (Key, 1937) (Cape Province, South Africa — Figs. 34, 35; Pl. V, figs. A, A', B, B') [Type species]; *Phymella capensis* Uvarov, 1922 (Cape Province, South Africa — Figs. 36, 40; Pl. V, figs. C, D); *Anarchita optera* (Bolívar, 1902) (S. India — Figs. 37, 41; Pl. V, figs. K-N) [Type species]; *Zarytes squalinus squalinus* (Bolívar, 1884) (S. India — Figs. 38 A-G, 42 A, B; Pl. V, figs. E, F) [Type species]; *Z. s. brachycerus* (Kirby, 1914) (N., NE. and C. India — Figs. 38 H-J, 42 C, D; Pl. V, figs. G-J); *Leptea debilis* (Finot, 1894) (Algeria — Figs. 39, 43; Pl. VI, figs. A-D) [Type species]; *L. albotaeniata* (Werner, 1908) **stat. nov.** [= *guichardi* Dirsh, 1952]⁷ (Tripolitania — Pl. VI, figs. E-H); *Pyr-*

⁶ 1 ♂, 1 ♀ syntypes, "Caconda, Anchieta", in Madrid, not Lisbon; ♂ here designated lectotype.

⁷ *Syn. nov.*—Werner's types of *Pyrgomorpha albotaeniata* cannot be traced and must be presumed lost; they are certainly not with his other material in Vienna. His description makes it clear that *albotaeniata* is a species of *Leptea* agreeing very closely with *L. guichardi*. As the type localities of the two species

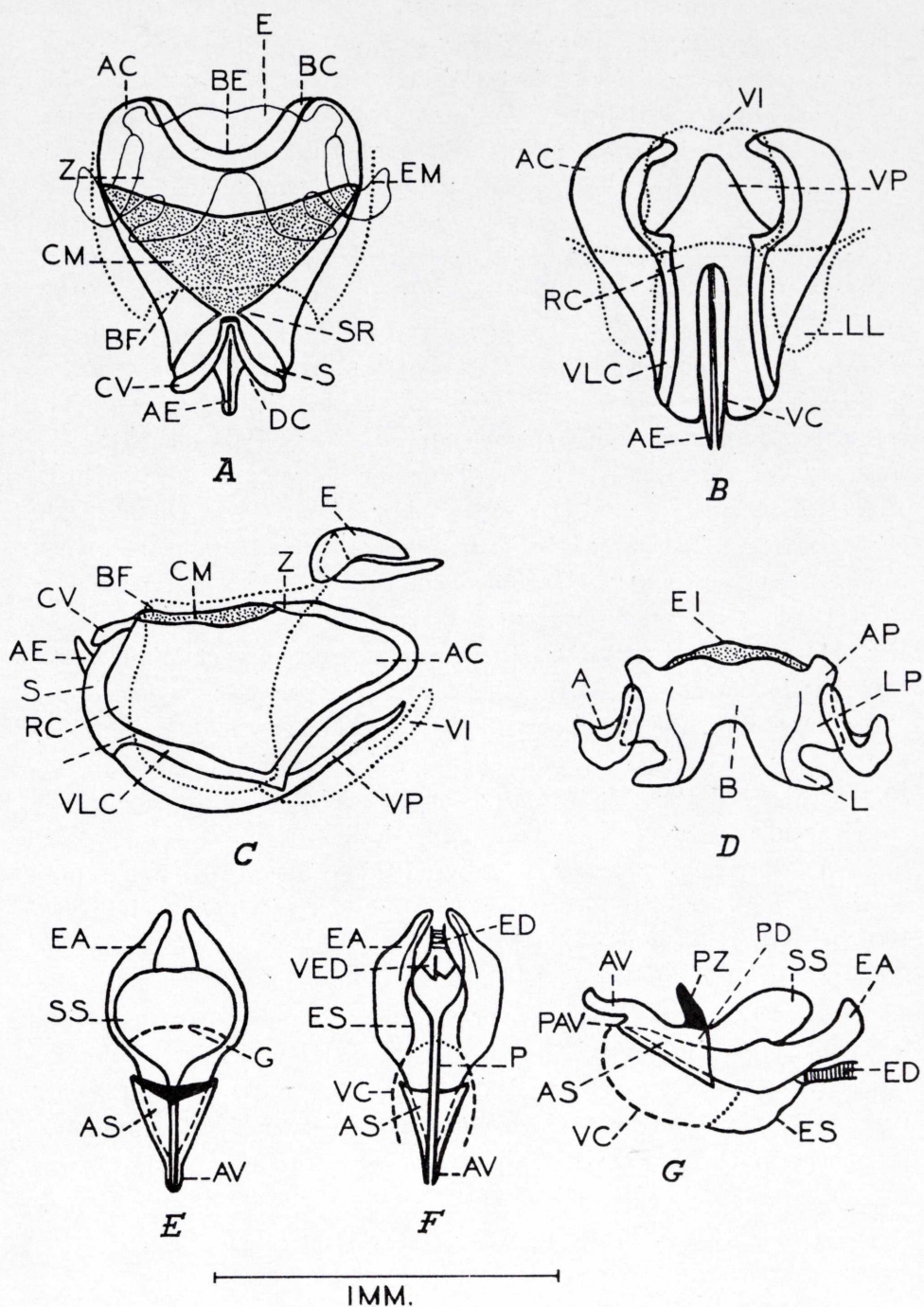


Fig. 21.—*Pyrgomorphini* (*Pyrgomorphina*): *Macroleptea laevigata* (Werner), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.

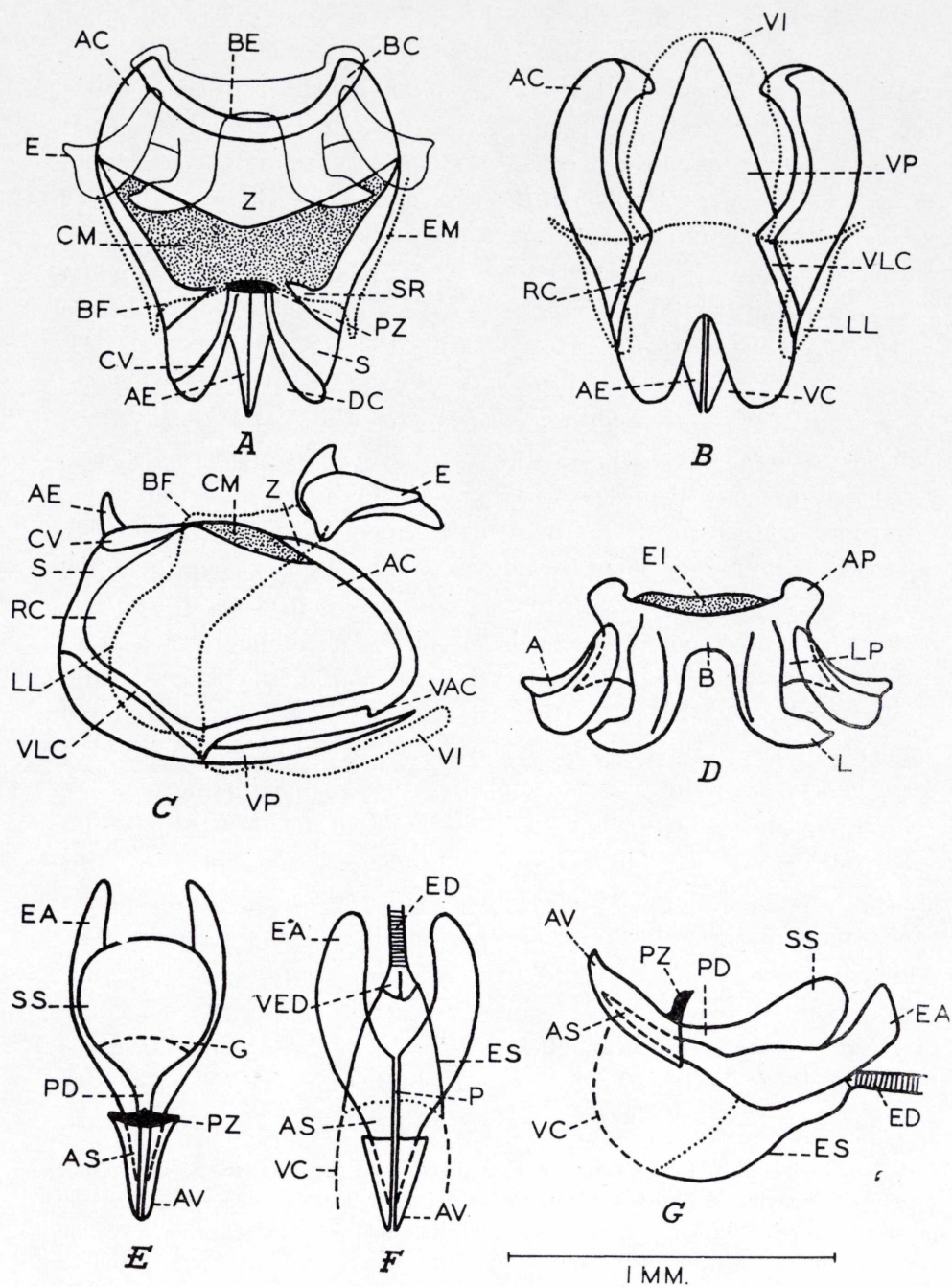


Fig. 22.—*Pyrgomorpha* (*Pyrgomorpha*): *Pyrgomorpha conica conica* (Olivier), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.

gomorphula serbica (Pančić in Brunner von Wattenwyl, 1882) (Serbia — Figs. 44, 48; Pl. VI, figs. I-L) [Type species].

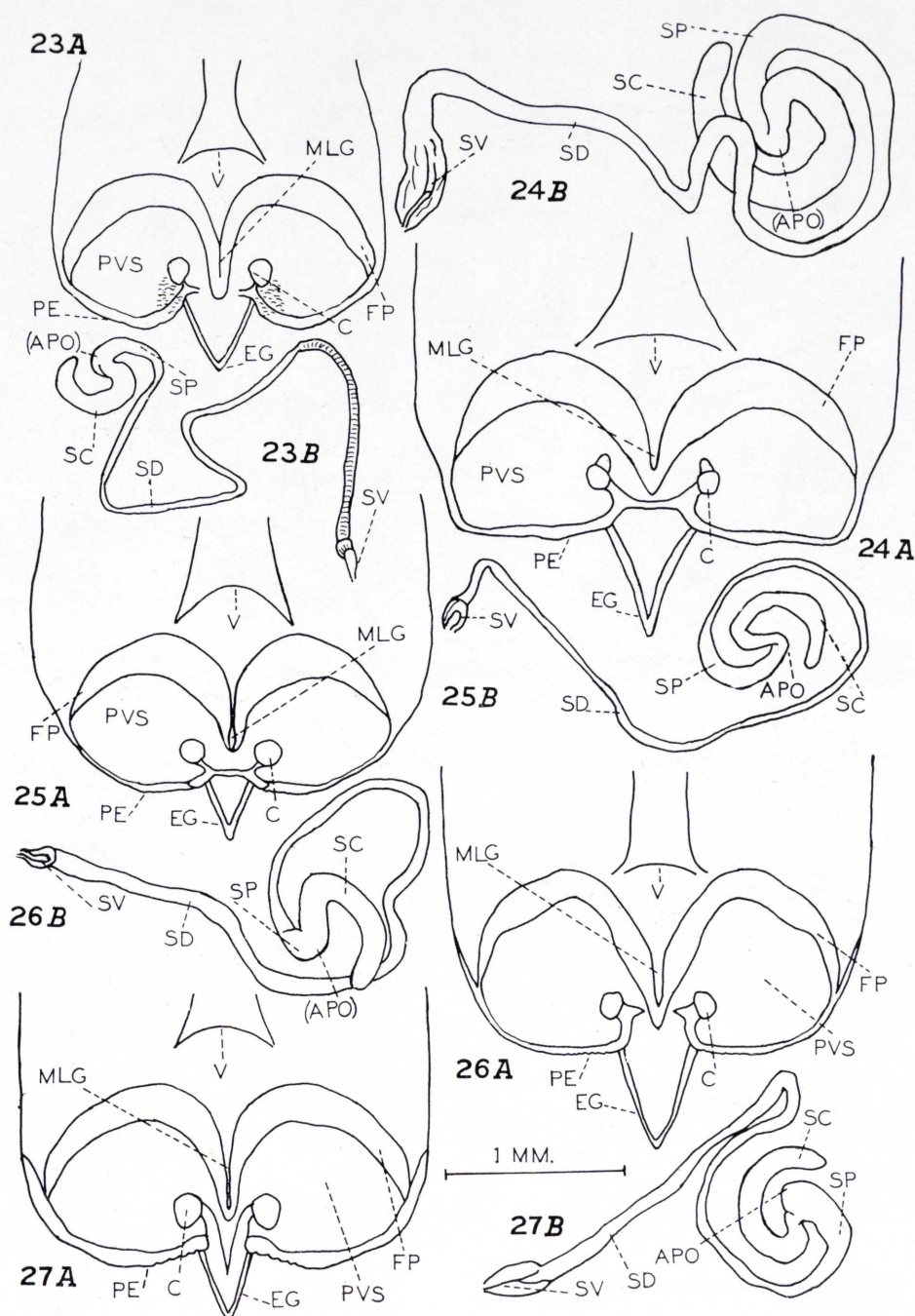
Other species and subspecies: *Ochrophlegma violacea* (Stål, 1876) (SW. Africa, Angola, Rhodesia); *Tanita purpurea* Bolívar, 1904 (northern Cape Province, South Africa to Rhodesia and Angola); *T. subcylindrica orientalis* Kevan, 1962 (S. Tanzania); *T. rosea* (Bolívar, 1908) (Zaire Republic); *Plerisca peringueyi* Bolívar, 1904 [? = *rubripennulis* (Key), listed with "species examined"] (S. Cape Province, South Africa) (Pl. II, figs. A, B) [Type species]; *Protanita longiceps* (Bolívar, 1904) (Tanzania coast); *Pyrgomorphella carinulata* Kevan, 1956 (Eritrea); *P. curtula* Uvarov, 1952 (S. Arabia — Pl. III, figs. G-J); *Pyrgomorphula turcica* Karabağ, 1961 (SE. Turkey — Pl. VI, figs. M, N); *Tanitella sanderi* (Krauss, 1901)*; *Miopyrgomorphia fischeri* (Heer, 1865) (Miocene of C. Europe) [Type species].

It may be noted that *Plerisca* is unusual for the subtribe in that the columellae are absent from the female subgenital plate (presumably associated with the peculiar, strongly excised posterior margin of the plate); in the male, however, the epiphallus is quite typical for *Pyrgomorphina*. *Pyrgomorphula* is also atypical, for, although it possesses distinct columellae, the externolateral expansions of the lateral plates of the epiphallus, albeit that they are distinct, are rounded and not angular. There is little doubt, however, of the affinities of either of these genera with the present subtribe rather than with the next.

No published work includes an account of all members of this subtribe, but Kevan (1962 b) gives a comprehensive revision of all the genera containing fully winged species, with the exception of *Zarytes* [for which, and for *Anarchita*, see Kevan (1970)] and *Pyrgomorpha*. Although many works have partial keys and accounts of this latter genus, none is reliable. For some clarification on the nomenclature of *Pyrgomorpha*, see Kevan (1970, 1971, 1974). Some modifications to the work of Kevan (1962 b) are given by Dirsh (1966), but his con-

are virtually identical (at or near Tripoli) there seems little reason to doubt that they are synonymous. Such differences as exist are clearly due to the alcoholic preservation of Werner's material (as indicated by his enlarged figure of the female). In the absence of Werner's types, the holotype of *guichardi* should be regarded as neotype of *albotaeniata*.

* *Stat. nov.*—*Pyrgomorpha sanderi* has been considered a synonym of *P. granulata*; the ♀ type indicates a distinctive short-winged species resembling *Tanitella*, not *Pyrgomorpha*.



Figs. 23-27.—*Pyrgomorphini* (*Pyrgomorpha*), female structures: 23) *Macroleptea laevigata* (Werner); 24) *Pyrgomorpha vignaudii vignaudii* (Guérin-Méneville); 25) *P. conica tereticornis* (Brullé) [Senegal population] = *P. cognata*, *auctt.*, *nec* Krauss; 26) *P. guentheri* Burr; 27) *Somalopyrgus rotundipennis* Kevan, paratype. A, B, as in Figs. 4-6. For notation, see pp. 199-201.

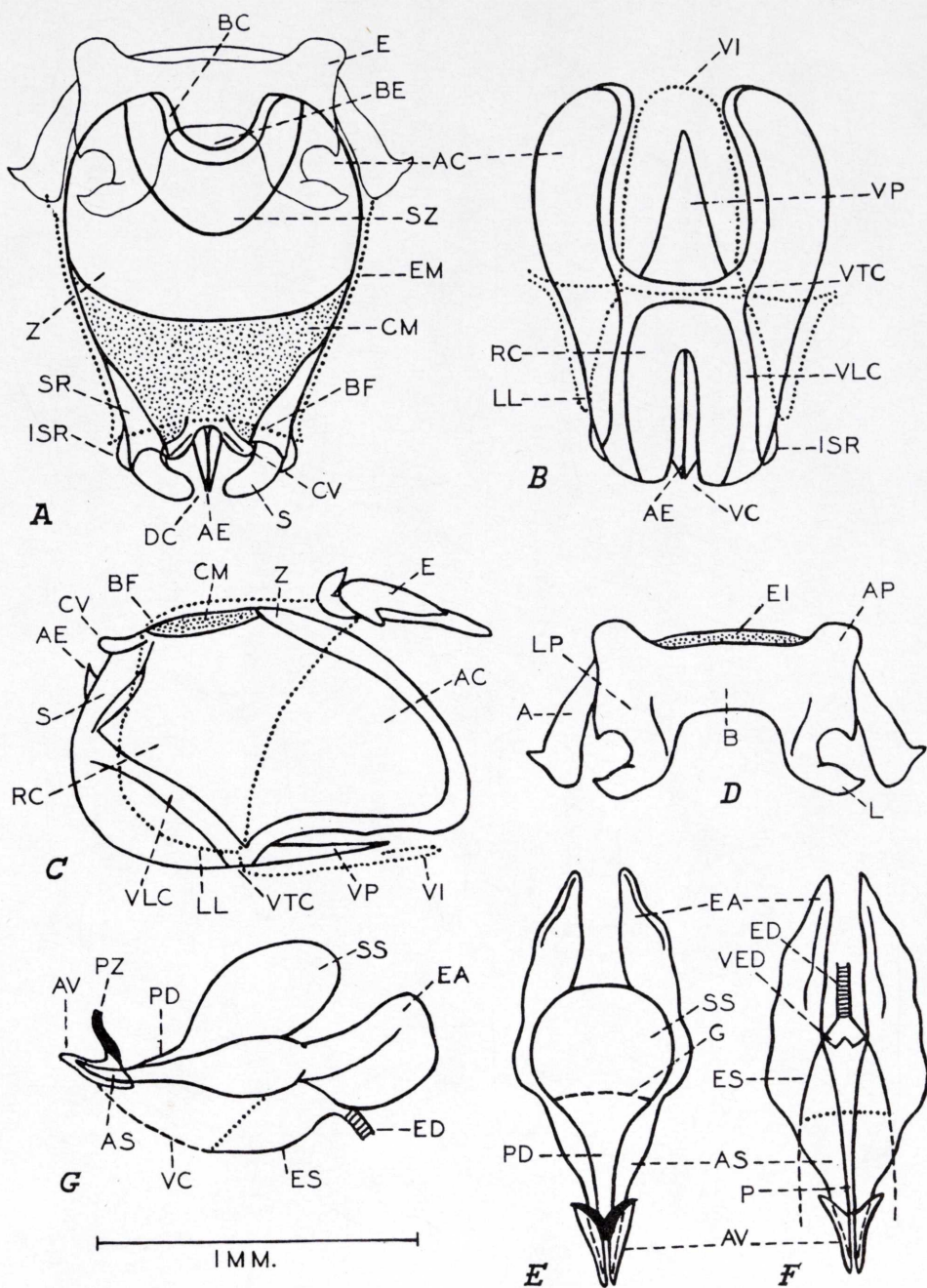


Fig. 28.—*Pyrgomorphini* (*Pyrgomorphina*): *Somalopyrgus rotundipennis* Kevan, paratype, phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.

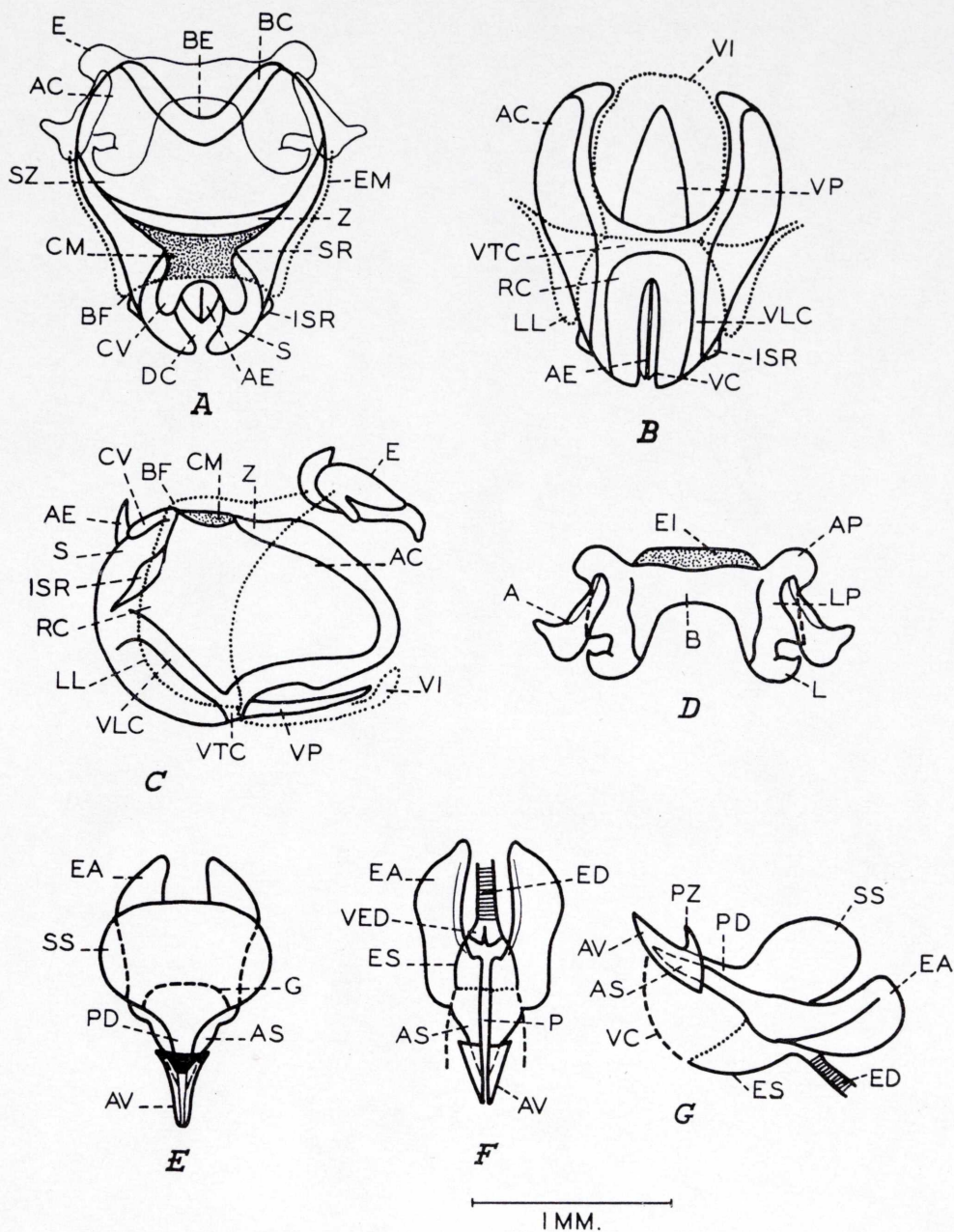
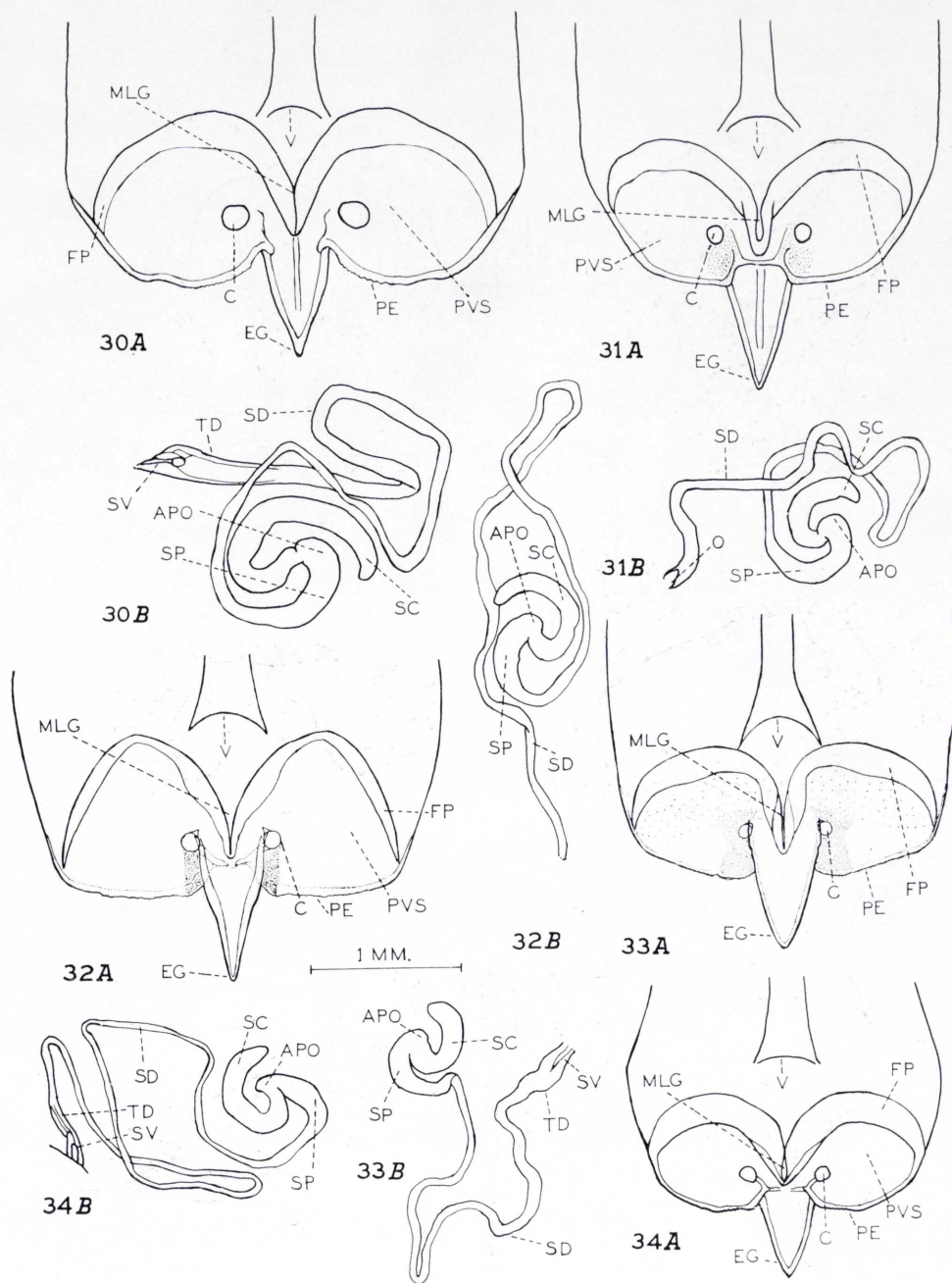


Fig. 29.—*Pyrgomorphini* (*Pyrgomorphina*): *Pyrgomorphella sphenarioides* Bo-livar, phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.



Figs. 30-34.—*Pyrgomorphini* (*Pyrgomorphina*), female structures: 30) *Pyrgomorphella sphenarioides* Bolívar; 31) *P. madecassa* Bolívar; 32) *P. tulcarensis* Descamps et Wintrebert; 33) *P. dichrostachyae* Descamps et Wintrebert; 34) *Phymelloides rugosus* (Key). A, B, as in Figs. 4-6. For notation, see pp. 199-201.

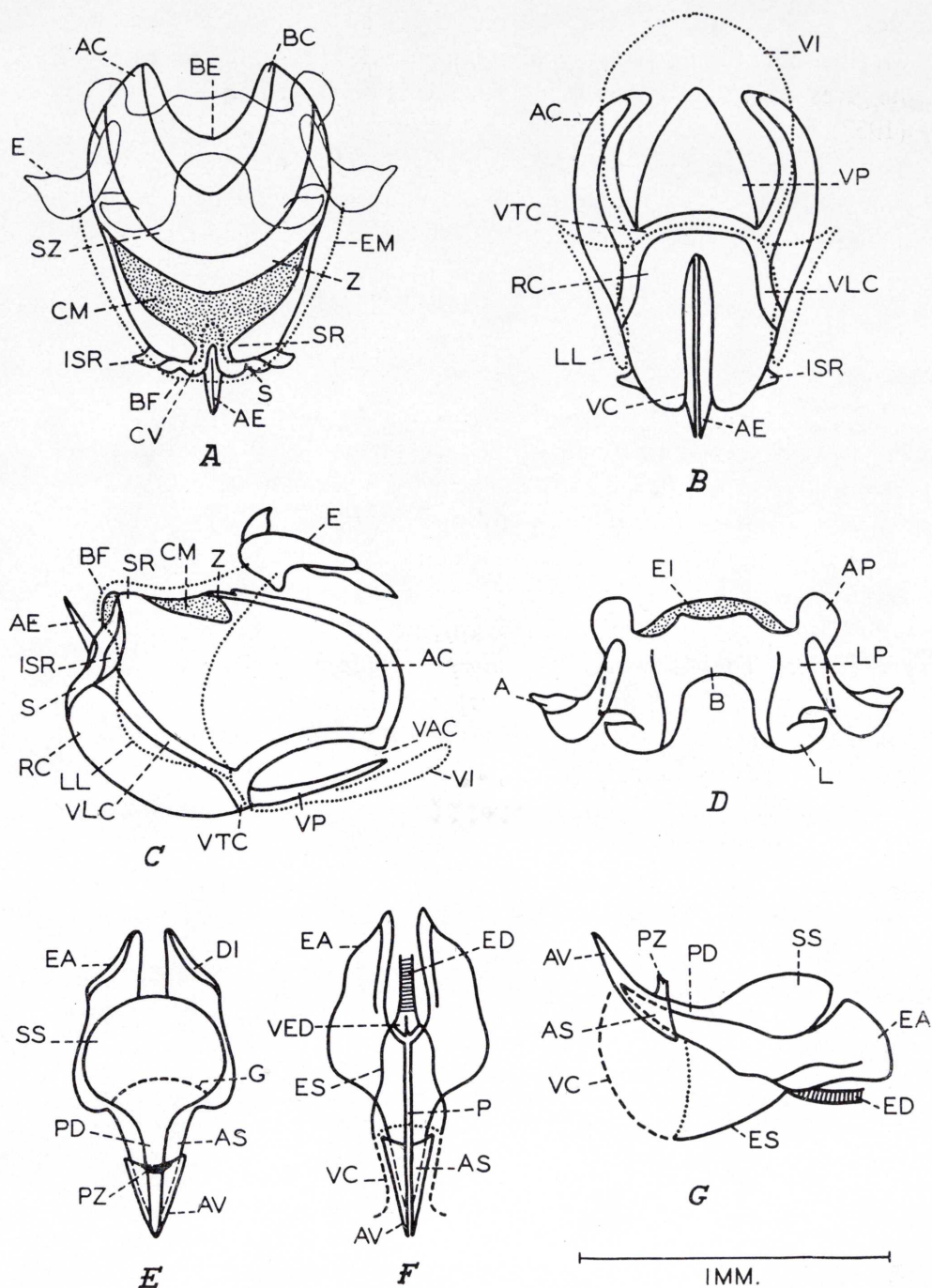


Fig. 35.—*Pyrgomorphum* (*Pyrgomorphina*): *Phymelloides rugosus* (Key), phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.

clusions regarding *Ochrophlebia* and *Tanita* are not fully accepted here and there are inaccuracies in some of his statements. He maintains some of the same synonymy in a later work (Dirsh, 1970), in which he gives a key to *Tanita* species, but this is only partially valid. Dirsh (1952) discusses the two species of *Leptea*. Kevan and Akbar (1953) do the same for *Pyrgomorphula*. They also give a reasonably up-to-date revised list of species for *Pyrgomorphella*, to which, however, should be added recently described Madagascar forms. Descriptions and keys to the Malagasy species are given by Descamps and Wintrebert (1966 a, 1966 b), and by Dirsh and Descamps (1968). Except for *Plerisca* and, it seems, *Tanitella*, which are in need of further study, genera other than those mentioned in this paragraph are monotypic.

The earliest reference to the concealed copulatory apparatus of a member of this subtribe appears to be that of Chopard (1920) who gives sketches of the phallic structures of *Pyrgomorpha conica*. Slifer (1940) discusses and figures the spermatheca of *P. cyprina*, but Roberts (1941) makes no reference to the male structures of any included genus. Dirsh (1956), however, figures the epiphalli of several members of the subtribe: *Ochrophlebia cafra cafra* [as *O. cafer*], *Laufferia chloronota*, *Tanita obesa*, *Pyrgomorpha conica*, *Pyrgomorphella granulosa*, *Zarytès squalinus* [squalinus] and *Leptea debilis*. The same author had earlier illustrated the epiphalli of *L. debilis* and *L. albo-taeniata* [as *L. guichardi*] (Dirsh, 1952) and of *P. conica* (Dirsh, 1953, 1954). He also later (Dirsh, 1963) gives sketches of the spermatheca and phallic structures of *Pyrgomorphella minuta* and of the spermatheca of *Pyrgomorphella madecassa*. The phallic structures of *Pyrgomorphula serbica*, *Pyrgomorphella sphenarioides*, *Phymelloides rugosa* and *Plerisca rubripennulis* are figured by Kevan and Akbar (1963). Some of their figures are repeated here in modified form. Although Agarwala (1954) mentions some features of the female subgenital plate of *Pyrgomorpha conica*, he does not illustrate it, but Randell (1963) gives a figure of the female subgenital armature of *Pyrgomorpha* sp. [= *P. b. bispinosa*]; Akbar (1966) illustrates the same structure and the epiphallus for *Pyrgomorpha* [same sp.]. Dirsh (1965) again figures epiphalli for *Leptea albo-taeniata* [as *L. guichardi*], *Pyrgomorpha conica*, *Tanita obesa*⁸, *Ochrophlebia cafra cafra* [as *O. caffra*] and *Laufferia chloronota*. Kevan (1966) figures the genitalic apparatus

⁸ Now = *T. stulta*.

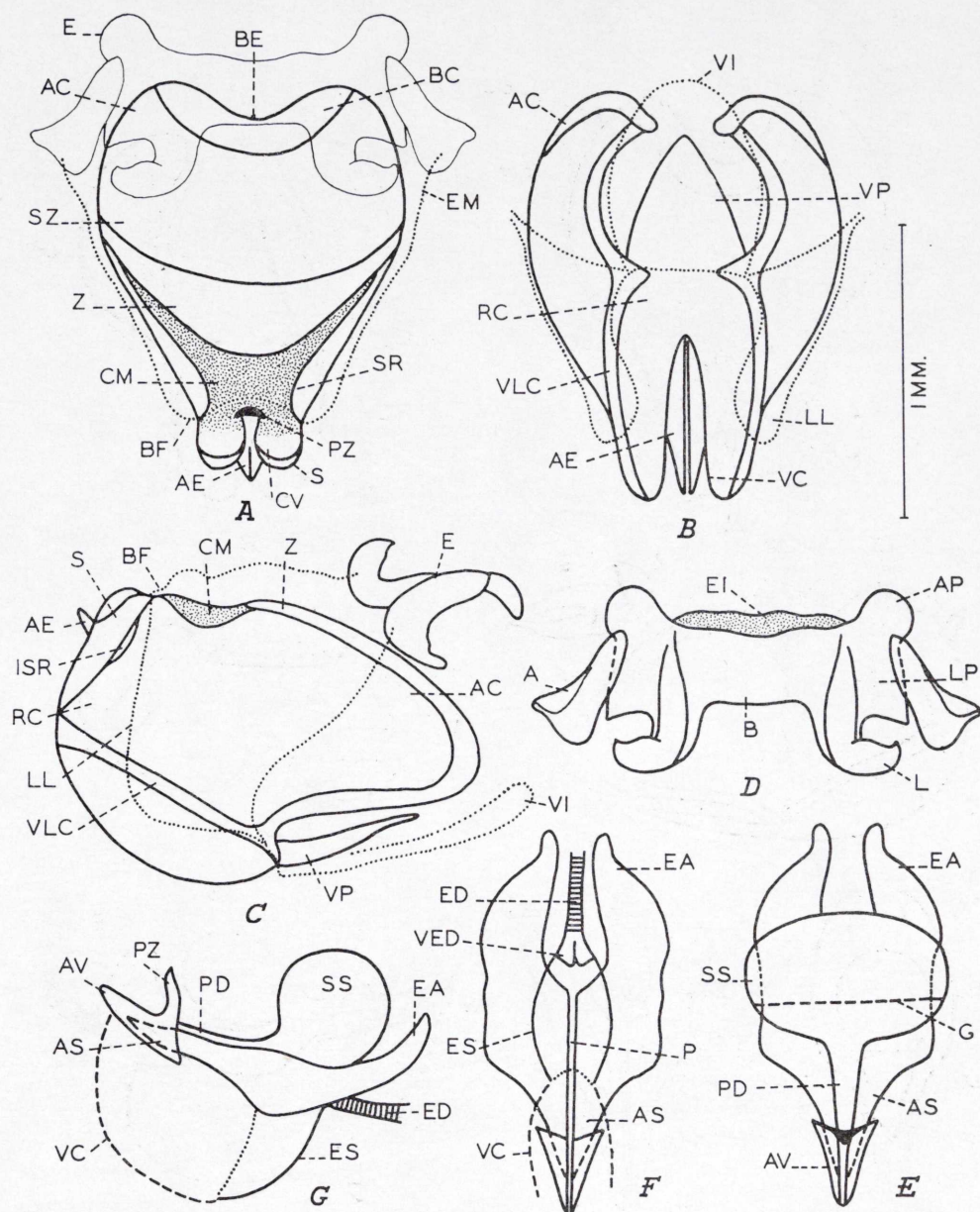


Fig. 36.—*Pyrgomorphini* (*Pyrgomorphina*): *Phymella capensis* Uvarov. A-G, as in Fig. 1. For notation, see pp. 199-201.

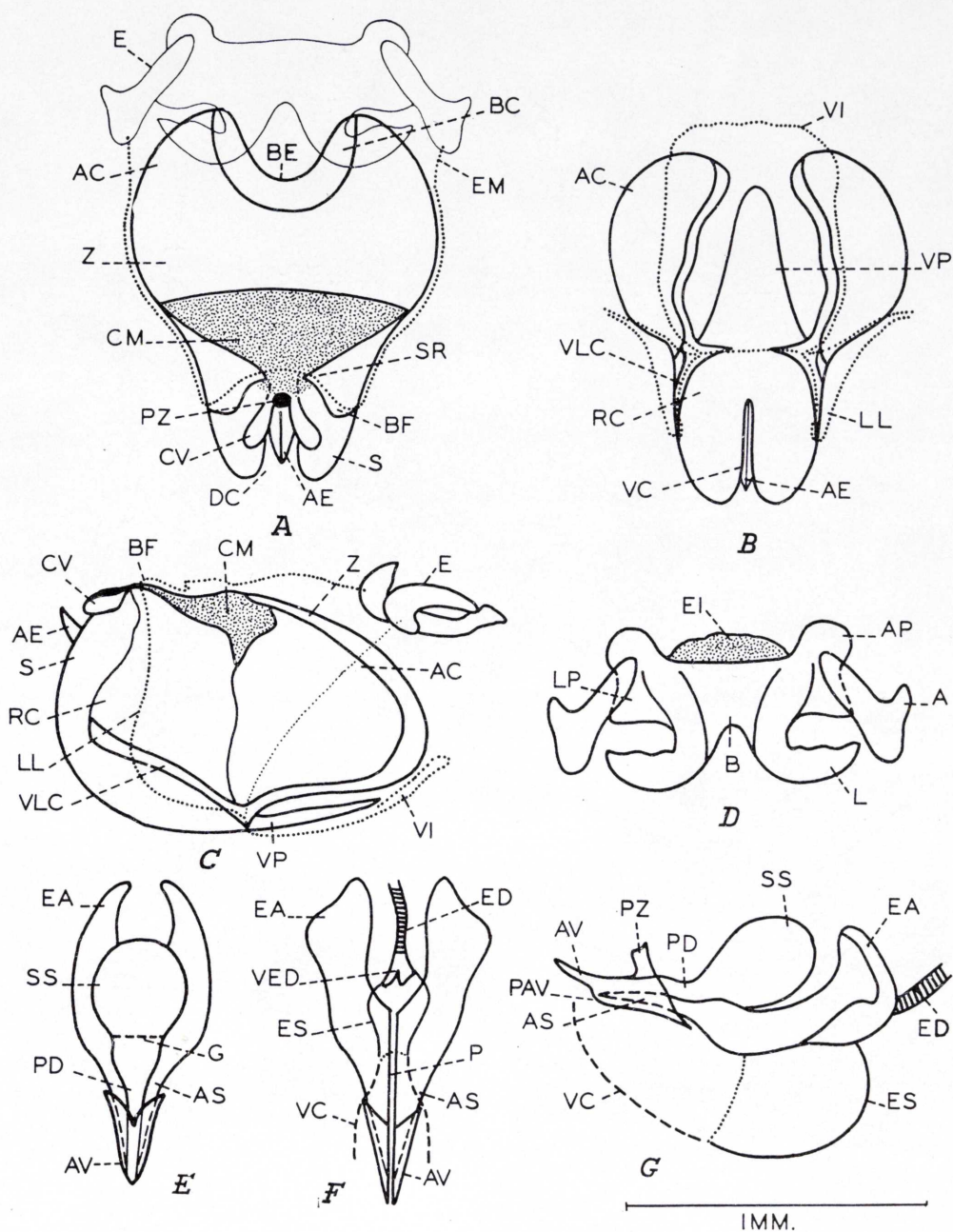


Fig. 37.—*Pyrgomorphini* (*Pyrgomorphina*): *Anarchita aptera* (Bolivar), phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.

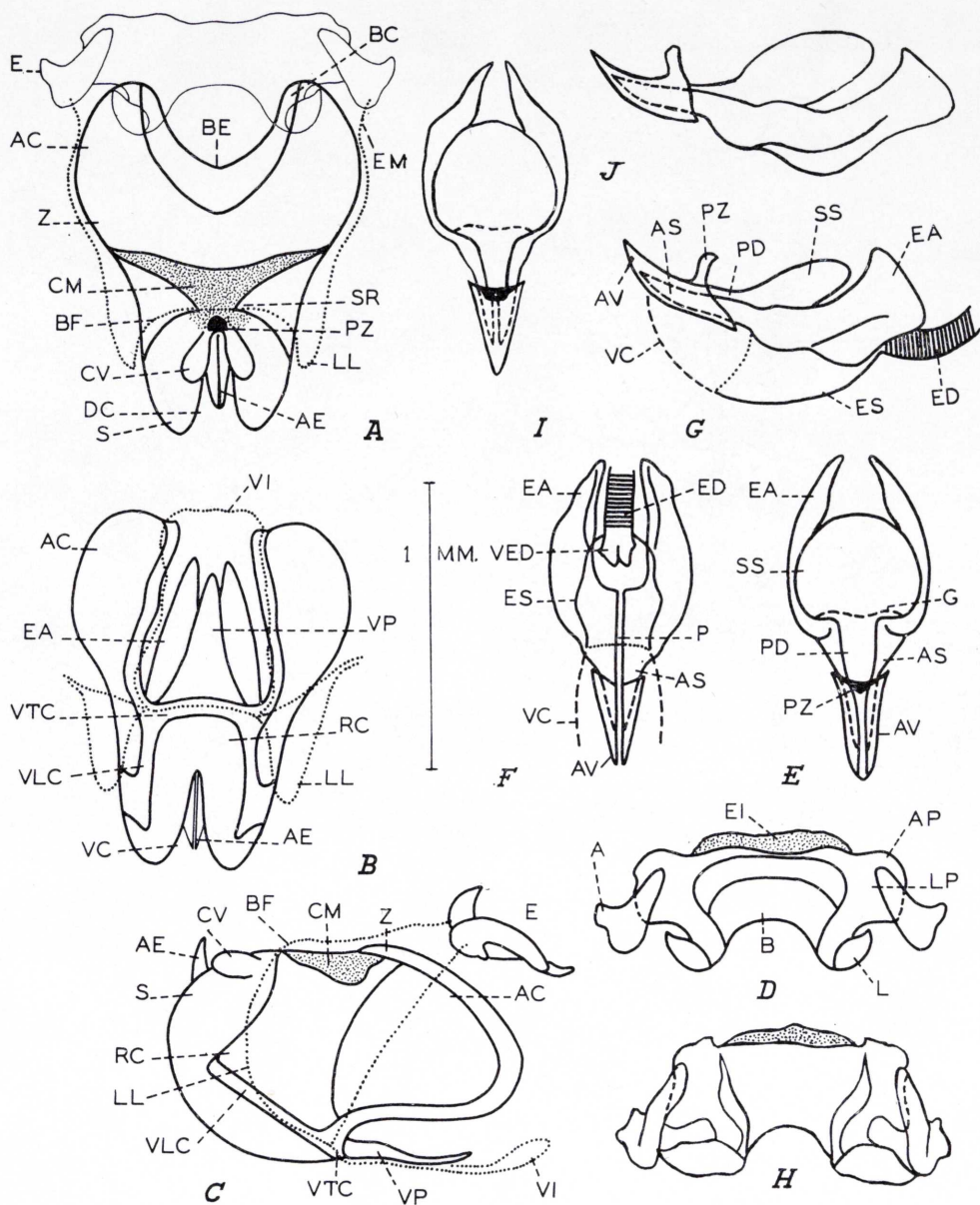


Fig. 38.—*Pyrgomorphini* (*Pyrgomorphina*): *Zarytes squalinus*, phallic structures. A-G, *Z. squalinus squalinus* (Bolivar); H-J, *Z. s. brachycerus* (Kirby). A-G, as in Fig. 1; H, epiphallus, dorsal; I, aedeagus, dorsal; J, the same, lateral. For notation, see pp. 199-201 [Note: Fig. D illustrates an epiphallus of an extreme transverse form].

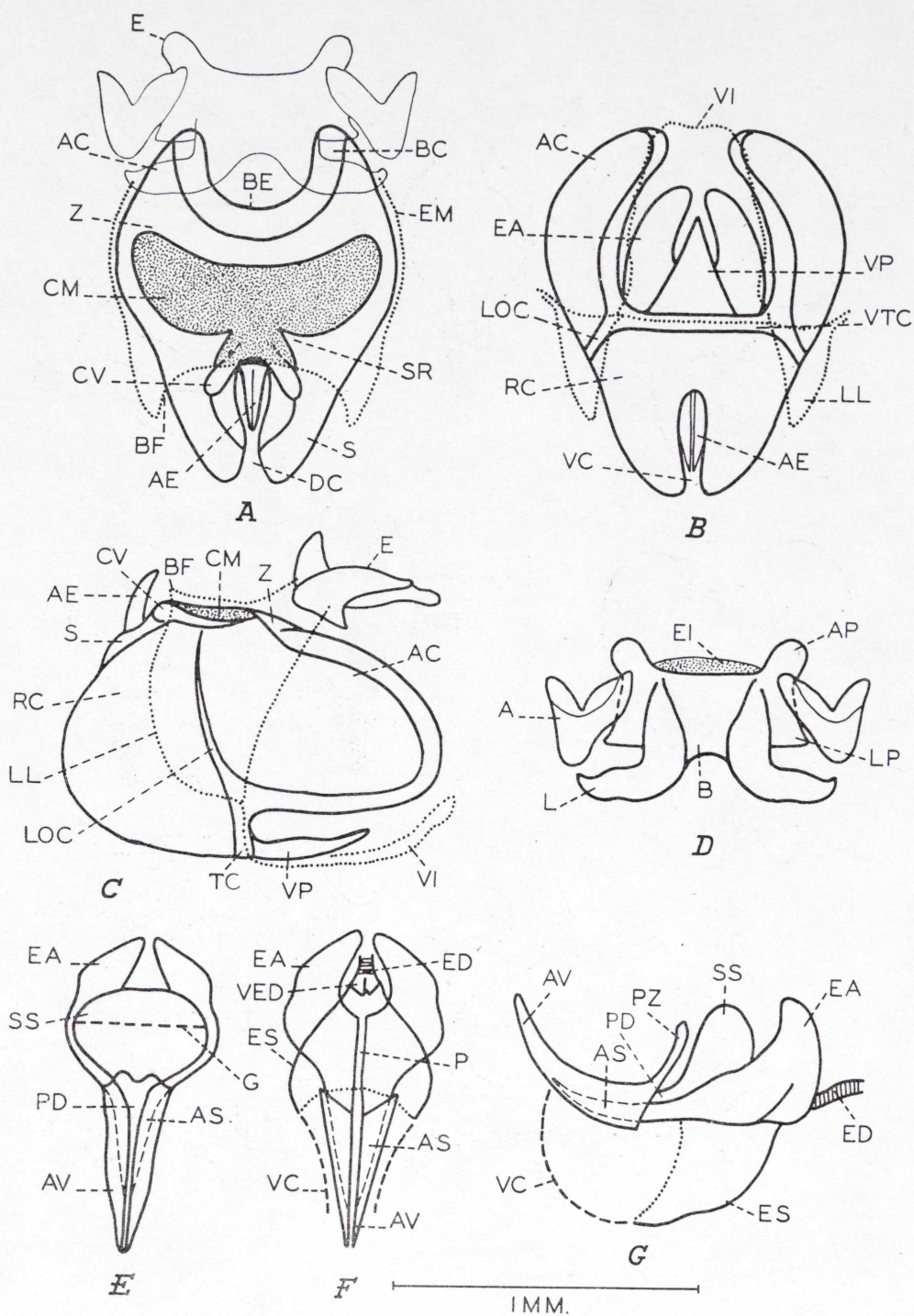
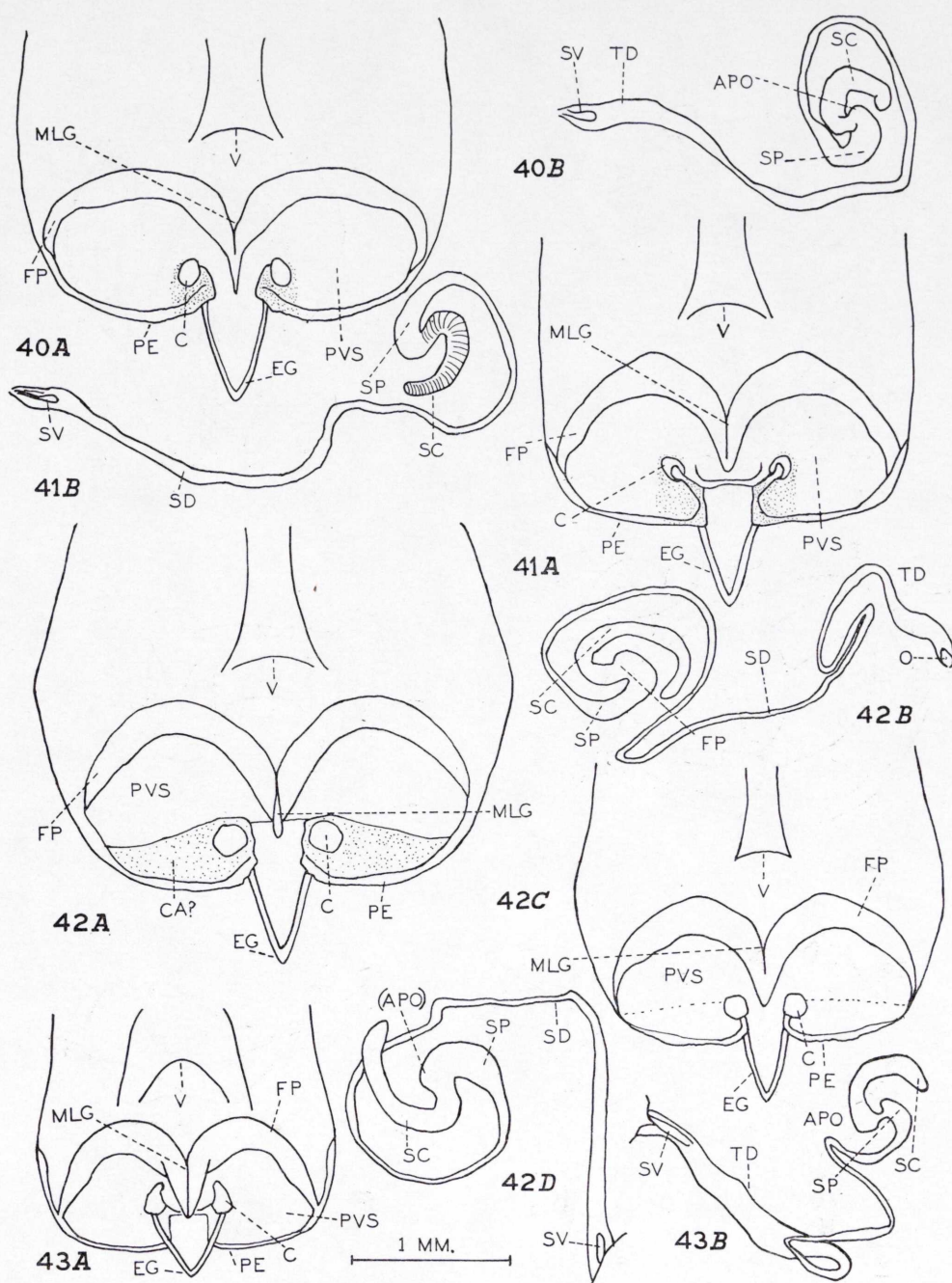


Fig. 39.—*Pyrgomorphini* (*Pyrgomorphina*): *Leptea debilis* (Finot), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.



Figs. 40-43.—*Pyrgomorphini* (*Pyrgomorphina*), female structures: 40) *Phymella capensis* Uvarov; 41) *Anarchita aptera* (Bolívar); 42) A, B, *Zarytes squalinus* (Bolívar); 42) C, D, *Z. s. brachycerus* (Kirby); 43) *Leptea debilis* (Finot). A, C, subgenital plate, dorsal; B, D, receptaculum seminis. For notation, see pp. 199-201.

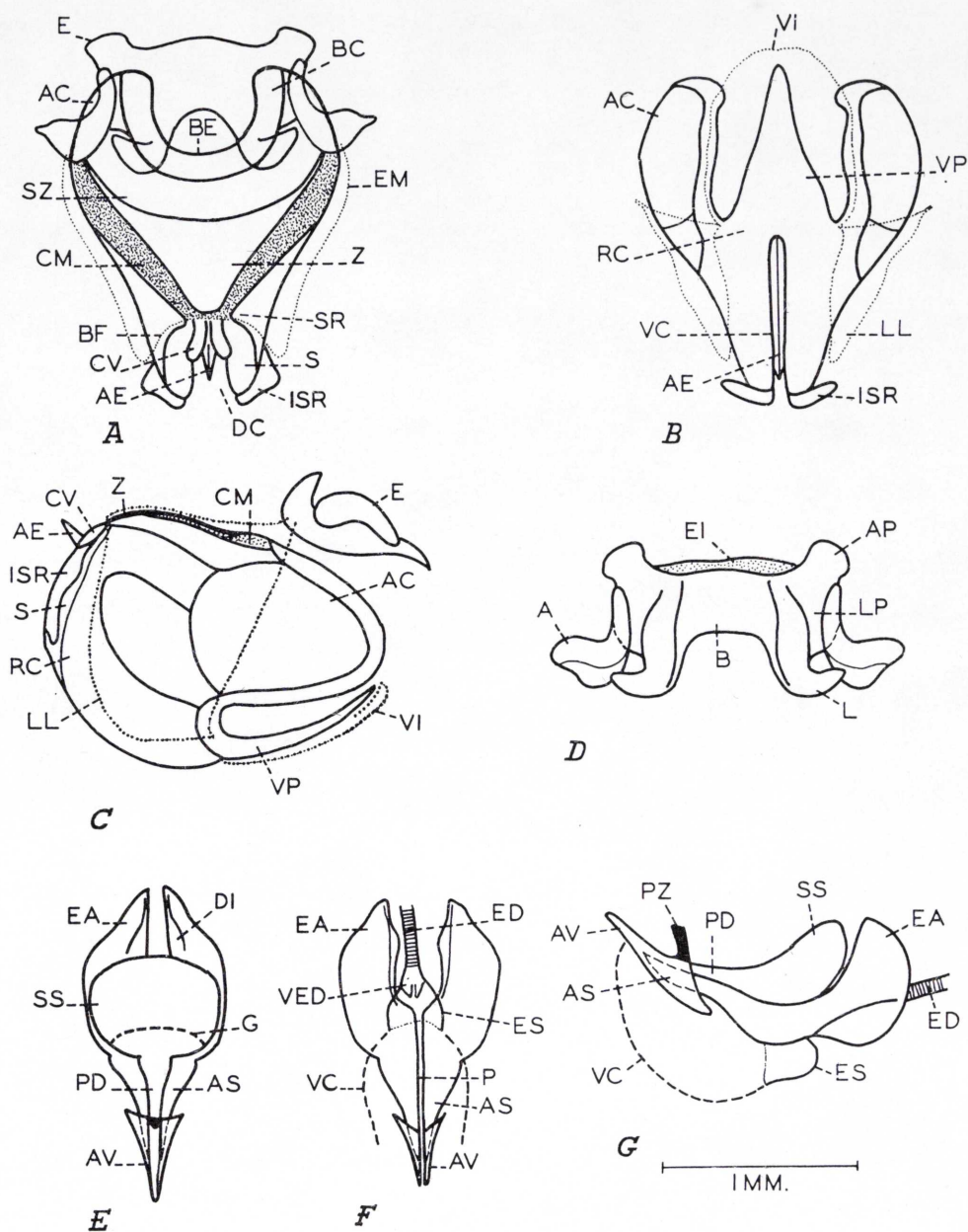


Fig. 44.—*Pyrgomorphini* (*Pyrgomorphina*): *Pyrgomorphula serbica* (Pančić in Brunner von Wattenwyl), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.

for both sexes of *Punctisphena punctata* and for the female of *Carinisphena producta*, also indicating the difference between *Pyrgomorphina* and *Parasphenina*. Descamps and Wintrebert (1966 b) illustrate both sexes of *Pyrgomorphella dichrostachyae* and *P. tulearensis*, and their figures are repeated by Dirsh and Descamps (1968) together with those already referred to for *P. madecassa* and *P. minuta*. Kevan (1968 d) illustrates both sexes of *Pyrgomorpha maculifemur*, and (1970) *Zarytes squalinus* (both subspecies) and *Anarchita aptera*.

Subtribe b. PARASPHENINA.

(Figs. 49-62; Pl. VII-XIII, XIV, figs. A-J).

Subfam. *Poecilocerinae* Bolívar, 1904, *Bol. Soc. esp. Hist. nat.*, IV, 132 (*partim*) [*Stenoscepa*].

Sect. *Poeciloceri* Bolívar, 1909, *Gen. Ins.*, XC, 4, 20 (*partim*) [*Stenoscepa*].

Group *Sphenarii* Uvarov, 1937, *J. Linn. Soc. Lond. (Zool.)*, XL, 279, 280 (*partim*) [*Chirindites*].

Tribe *Sphenariini* Rehn, 1951, *Ent. News*, LXII, 243, 244 (*partim*) [*Chirindites*, ? *Stenoscepa*].

Subtribe *Parasphenina* Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1509, fig. 3 (map), 1523 (*partim*) [*Punctisphena* of last subtribe was included]; Kevan, 1966, *Proc. R. ent. Soc. London (B)*, XXXV, 84 (= 90); Kevan, Akbar and Chang, 1969, *Eos*, Madrid, XLIV (1968), 196; 1970, *ibid.*, XLV (1969), 177.

External features: Body usually distinctly fusiform, neither compressed nor depressed; integument rather smooth to strongly granular; colour usually basically green but frequently brownish or greyish, often with red, yellow and black markings; antennae slightly flattened at base, vertex not or but little arched dorsally in lateral view, frontal profile evenly and not very strongly excavated, fastigium of vertex of moderate length; pronotal disc with lateral carinae present or absent, lateral pronotal lobe without an oblique ridge; tegmina and hind wings always greatly reduced or absent, never more than scales or short lobes (except in *Pezotagasta* where they are short, ovate-lanceolate).

Principal phallic characters: Epiphallus without externolateral expansions to the lateral plates, or, if these are present (as in some *Stenoscepa*, *Pezotagasta*, *Parasphenella* and *Afrosphenella* species), these are nearly always narrow with their outer angles (if any) very obtuse, lophi directed dorsally or slightly dorsolaterally (not laterally);

ectophallus with central membrane usually V-shaped, only occasionally small and triangular (*Parasphena*), posterior margin of zygoma usually distinctly produced, suprazygomal plate truncate or slightly emarginate apically, or tongue-like, basal emargination always small; endophallic apodemes often with strongly developed dorsal inflections which may be produced backwards in lateral view, aedeagal valves seldom with ventro-lateral processes or pockets receiving the ends of the 'aedeagal sclerites'.

Concealed female structures: subgenital plate without distinct columellae (except in *Stenoscepa*), although thickened areas may be present at the base of the egg-guide; spermatheca as in *Pyrgomorphina*.

Distribution: Southern and eastern Africa, SW. Arabia.

Included genera: *Stenoscepa* Karsch, 1896; *Parasphenella* Kevan, 1956; *Chirindites* Ramme, 1929; *Parasphena* Bolívar, 1884; *Pezotagasta* Uvarov, 1953; *Parasphenula* Kevan, 1956; *Afrosphena* Kevan, 1956; *Afrosphenella* Kevan and Akbar, 1964.

Dirsh (1961) synonymized *Parasphenella*, *Parasphenula* and *Afrosphena* with *Stenoscepa*, and certain other authors have followed him, notably Johnston (1968). Kevan (1966), however, disagreed, but suggested that the second two genera might deserve only subgeneric status. Nevertheless, the phallic structures and external morphology of all of these taxa are neither more nor less similar to each other than are those of other genera in the subtribe, and (as indicated by the arrangement above) they do not, on the basis of their phallic structures, all come to lie in juxtaposition. Each, therefore, is here allowed to retain full generic status⁹.

Species examined: *Stenoscepa granulata* (Karsch, 1888) (SW. Tanzania — Figs. 45, 49) [Type species]; *S. obscura* (Kevan, 1962) (SW. Tanzania, N. Zambia); *Parasphenella meridionalis* (Kevan, 1956) (Orange Free State and Lesotho — Figs. 46, 50); *P. carinata* (Bolívar,

⁹ *Parasphenula obscura* Kevan, 1962, however, should be left in *Stenoscepa* (cf. Johnston, 1968). The characters given by Kevan (1956) to distinguish *Parasphenula* from *Stenoscepa* are not fully reliable, but the phallic structures of *obscura* are more like the latter than other species of *Parasphenula* so far studied. This is particularly so in the deeper bridge of the epiphallus (which has unusually prominent external lateral expansions), the less elaborate inflections of the endophallic apodemes, the lack of subventral pockets to the aedeagal valves accommodating the ends of the 'aedeagal sclerites', and the narrower suprazygomal plate (although it is not so narrow as in *S. granulata*). The typical colour pattern of *Parasphenula* never seems to be developed in *S. obscura*.

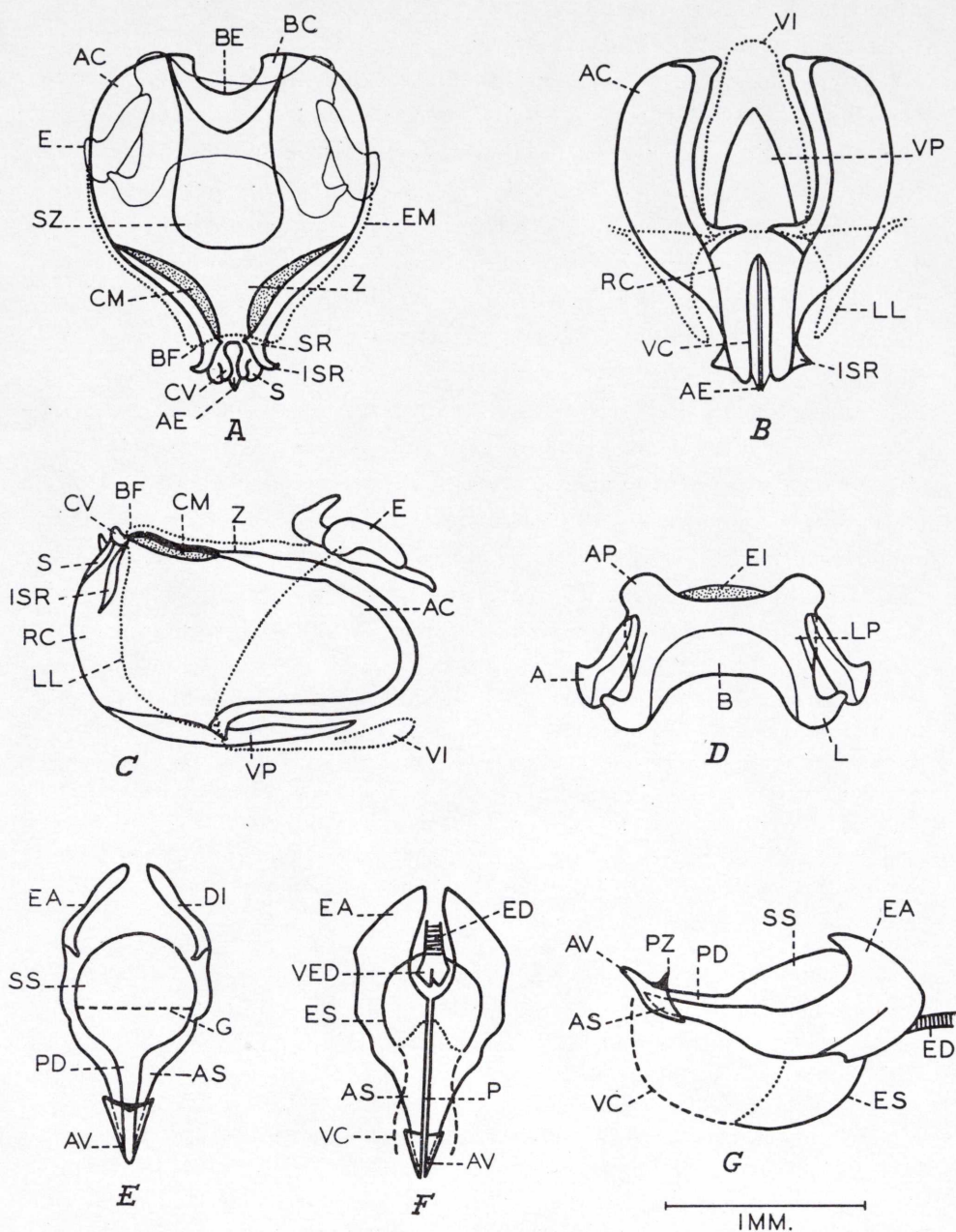


Fig. 45.—*Pyrgomorphini* (*Parasphenina*): *Stenoscepha granulata* (Karsch), phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.

1904) (Transvaal) [Type species]; *Chirindites odendaali* Ramme, 1929 [emend. from *oldendaali*¹⁰] (E. Rhodesia, W. Mozambique — Figs. 47, 51; Pl. VII, figs. A-F) [Type species]; *Parasphena pulchripes* (Gerstaecker, 1869) (Mt. Kilimanjaro — Figs. 52, 55; Pl. VIII, figs. E, F) [Type species]; *P. mauensis mauensis* Kevan, 1948 (W. Kenya Highlands — Pl. XI, figs. A, B); *Pezotagasta angolensis* (Rehn, 1953) (Angola — Figs. 53, 56; Pl. VII, figs. G-J) [Type species]; *P. bredoi* Dirsh, 1961 (Angola — Pl. VII, figs. K, L); *Parasphenula tewfiki* (Uvarov, 1938) (Yemen — Pl. XIII, figs. G-L); *P. yemenita* (Uvarov, 1938) (Yemen — Fig. 54; Pl. XIV, figs. A, B); *P. boranensis* (Salfi, 1939) (S. Ethiopia, N. Kenya — Fig. 57; Pl. XII, figs. E, F) [Type species]; *P. picta* (Bolívar, 1884) (Eritrea — Fig. 58)¹¹; *Afrosphena picticeps* (Bolívar, 1904) (Transvaal — Fig. 61) [Type species]; *A. gracilis* Kevan, 1956 (Rhodesia — Fig. 59); *Afrosphenella capensis* (Key, 1937) (W. Cape Province, South Africa — Figs. 60, 62; Pl. XIV, figs. G-J) [Type species]; *A. senecionicola* (Key, 1937) (SW. Cape Province — Pl. XIV, figs. C-F).

*Other species and subspecies*¹²: *Parasphenella dubia* (Bolívar, 1904) (S. Tanzania); *Parasphena campestris* Rehn, 1942 (uplands of NC. Kenya); *P. cheranganica* Uvarov, 1938 (Cherangani Mts.,

¹⁰ Ramme (1929) mis-spelt the name and Kevan's (1961) emendation is valid, although adopted by neither Dirsh (1965) nor Johnston (1968). It should also be noted that the original photographs of the synonymous *C. marshalli* and *C. swynnertoni* (Ramme, *l. c.*: Pl. IV, figs. 12 and 13) have had their numbers reversed, the smaller of the two (fig. 13) being *C. marshalli* and the larger (fig. 12), *C. swynnertoni*. These figures and that of the male "*oldendaali*" (Ramme, *l. c.*: Pl. IV, fig. 10) are all of holotypes, although this is not indicated.

¹¹ The type series in Vienna consists of 2 ♂♂ and 2 ♀♀, one of each sex being labelled Massaua, *Hildebrandt*, Col. Br. v. W. and [Brunner's number] 26.9114 (the male is here designated lectotype), the other male bears only the number 9114, and the other female is without data. Unfortunately no photograph of the lectotype is at present available.

¹² The holotype of *Parasphena nigropicta* Bolívar, 1889 (SW. Angola) is lost and no other material is certainly known. From the original description this is clearly not a *Parasphena* as it has scale-like tegmina. These, together with the virtually straight posterior margin of the pronotal disc, the external apical tibial spine, the strongly contrasting colour pattern of red, black and yellow on a pale background, the fact that the body is clothed with long grey hairs, and the geographical distribution, suggest that it probably belongs to an otherwise undescribed species of *Humpatella* (*Chloriscini*) and not to the present subtribe — see Part IV of this study (Kevan, Akbar and Chang, 1972).

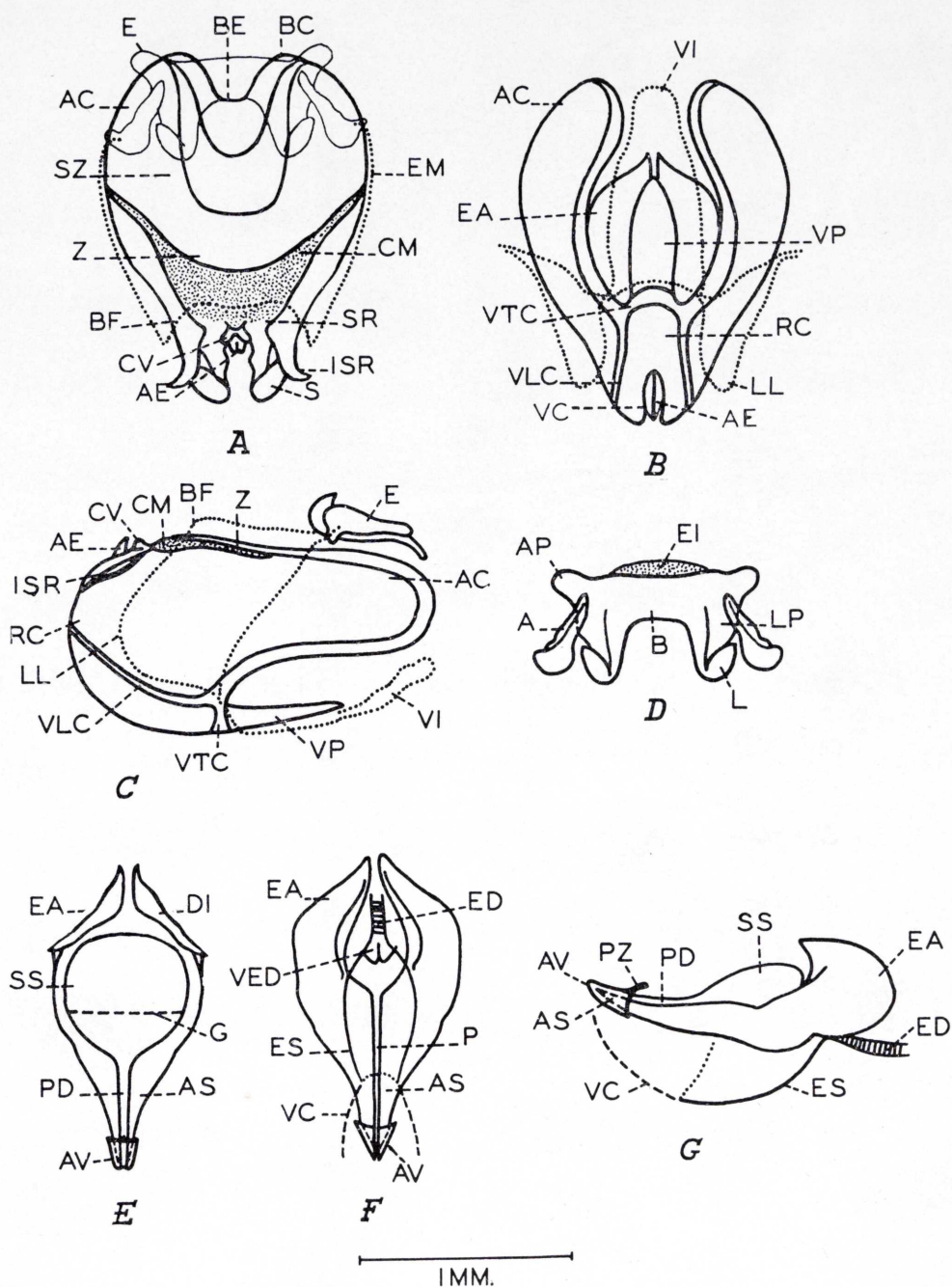


Fig. 46.—Pyrgomorphini (Parasphenina): *Parasphenella meridionalis* (Kevan), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.

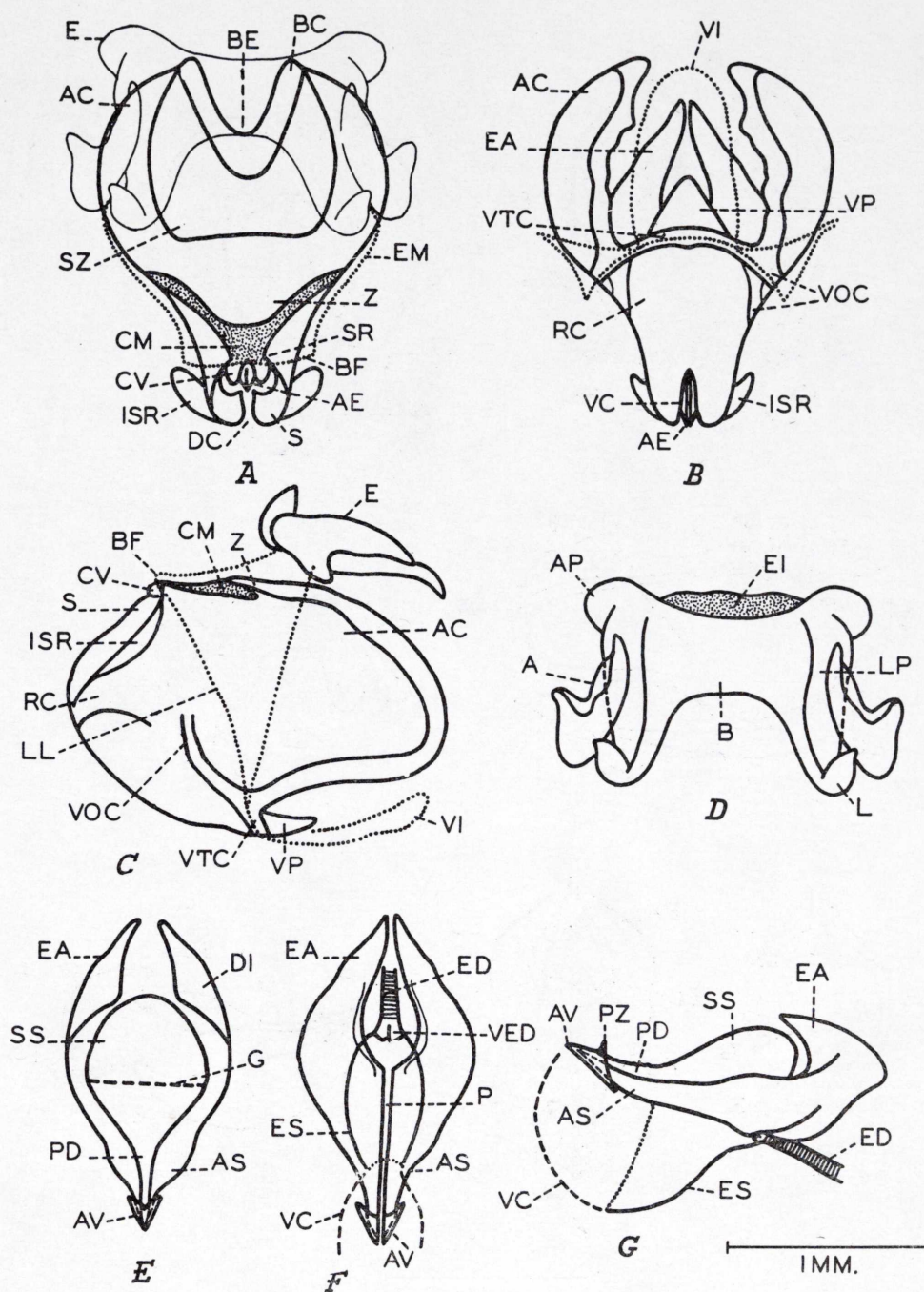
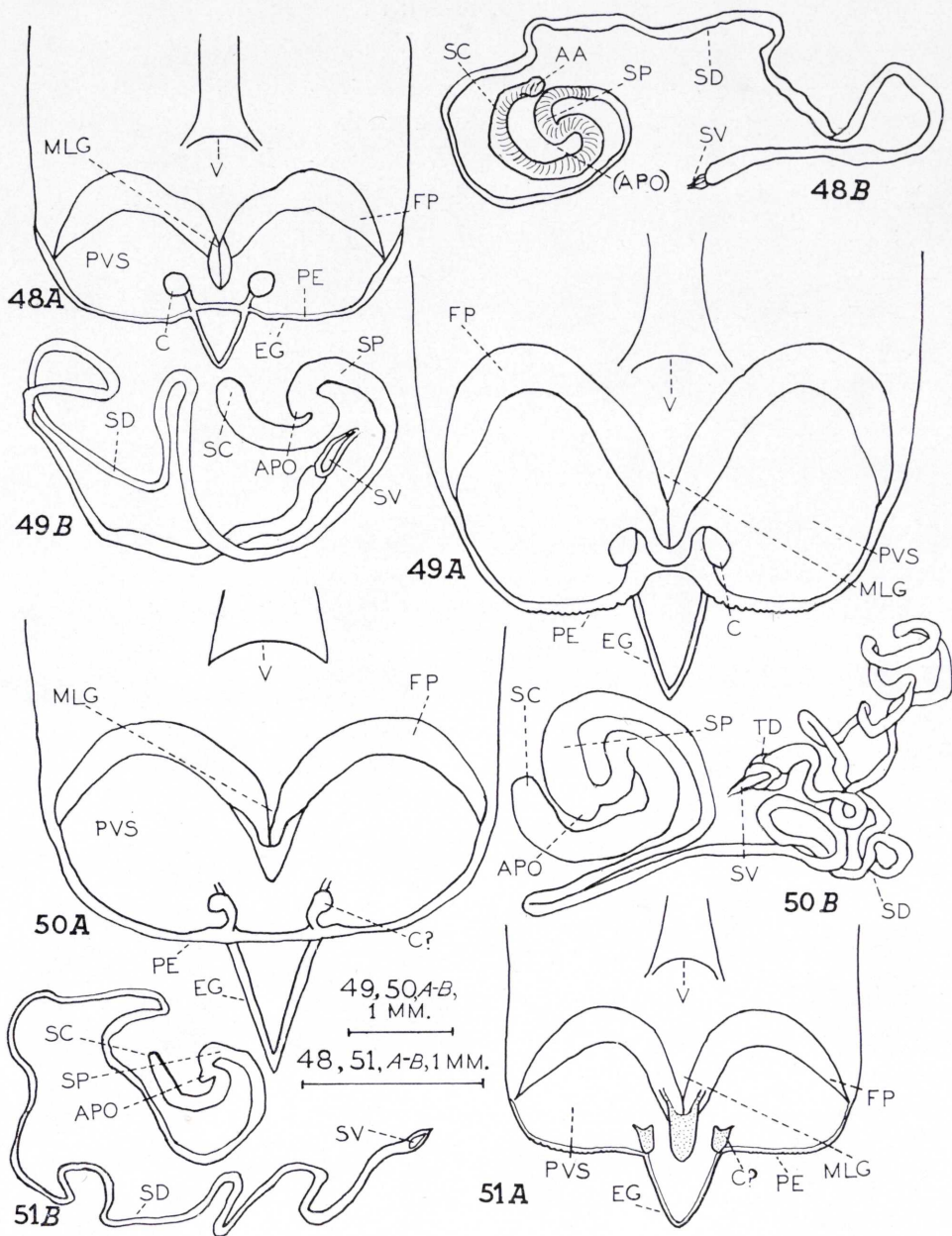


Fig. 47.—Pyrgomorphini (*Parasphenina*): *Chirindites odendaali* Ramme, phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.

W. Kenya — Pl. XI, figs. K-N); *P. chyuluensis* Kevan, 1948 (Chyulu Hills, SE. Kenya — Pl. VIII, figs. K-N); *P. elgonensis* Sjöstedt, 1933 (Mt. Elgon, W. Kenya, E. Uganda; Pl. VIII, figs. A-D); *P. imatongensis* Rehn, 1942 (Imatong Mts., S. Sudan); *P. kaburu* Kevan, 1948 (western Kenya Highlands — Pl. XI, figs. G-J); *P. mauensis kamasiansis* Kevan, 1948 (Kamasia Hills, W. Kenya — Pl. XI, figs. C-F); *P. keniensis keniensis* Sjöstedt, 1912 (Mt. Kenya — Pl. X, figs. C-F); *P. k. rehni* Kevan, 1956 (eastern Kenya Highlands — Pl. X, figs. G-J); *P. kinangopa* Uvarov, 1938 (upper Aberdare Range, C. Kenya — Pl. X, figs. A, B); *P. kulalensis* Kevan, 1956 (Mt. Kulal, N. Kenya); *P. meruensis meruensis* Sjöstedt, 1909 (Mt. Meru and environs, N. Tanzania — Pl. IX, figs. A-D); *P. m. zeuneri* Kevan, 1956 (Ngorongoro Crater, N. Tanzania — Pl. IX, figs. E-H); *P. nairobiensis* Sjöstedt, 1933 (Kenya uplands E. of Rift Valley — Pl. IX, figs. I, J); *P. naivashensis* Kevan, 1948 (Kenya Rift Valley — Pl. IX, figs. K-N); *P. ngongensis* Kevan, 1948 (Ngong Hills, SC. Kenya — Pl. X, figs. K-N); *P. teitensis* Kevan, 1948 (Teita Hills, SE. Kenya — Pl. VIII, figs. G-J); *Parasphenula abyssinica* (Uvarov, 1934) (S. and SC. Ethiopia — Pl. XIII, figs. A, B); *P. gallae* (Rehn, 1901) (Ogaden, SE. Ethiopia); *P. grandis* Kevan, 1956 (Mt. Kulal, N. Kenya); *P. iavellensis* (Kevan, 1948) [= *P. boranensis* — **syn. nov.** — reduced tegminal vestiges] (S. Ethiopia — Pl. XII, figs. G-J); *P. maxima* (Kevan, 1948) (Mt. Marsabit, N. Kenya — Pl. XII, figs. A-D); *P. montana* (Uvarov, 1934) (C. Ethiopia — Pl. XIII, figs. C-F); *Afrosphenella rhodesiensis* Kevan, 1956 (Zambia); *A. fusiformis* Kevan, 1956 (S. Tanzania).

This subtribe seems to be an offshoot of the last, characterized principally by the reduction or loss of the externolateral expansions of the lateral plates of the epiphallus and the presumably corresponding reduction or loss of the columellae of the female subgenital plate. In respect of the former, a few genera — *Pezotagasta*, *Parasphenella*, *Afrosphenella* — show a somewhat intermediate condition, as traces of epiphallic externolateral expansions are present (*Pezotagasta* also has larger tegminal vestiges than in other genera); *Stenoscepa*, on the other hand, has columellae on the female subgenital plate, but externolateral expansions on the epiphallus in only one of the two species (for which reason it is regarded as being the least removed from *Pyrgomorphina* and so is listed first). In *Pyrgomorphina*, *Pyrgomorphula* and *Plerisca* are somewhat intermediate to the present subtribe,



Figs. 48-51.—*Pyrgomorphini* (*Pyrgomorphina* and *Parasphenina*), female structures: 48) *Pyrgomorphula serbica* (Pančić in Brunner von Wattenwyl); 49) *Stenoscepa granulata* (Karsch); 50) *Parasphenella meridionalis* (Kevan); 51) *Chirindites odendaali* Ramme. A, B, as in Figs. 4-6. For notation, see pp. 199-201.

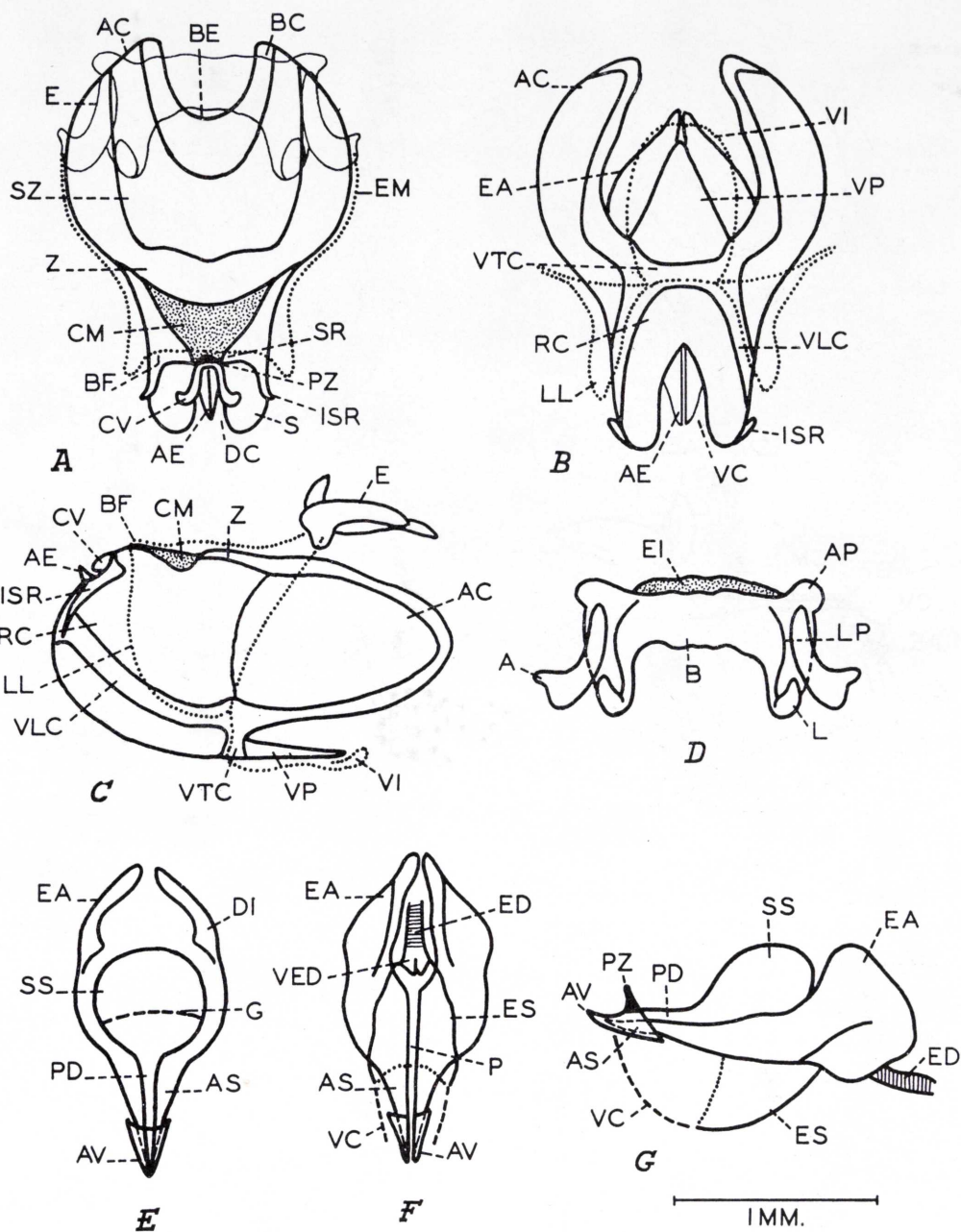


Fig. 52.—Pyrgomorphini (*Paraspheena*): *Paraspheena pulchripes* (Gerstaecker), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.

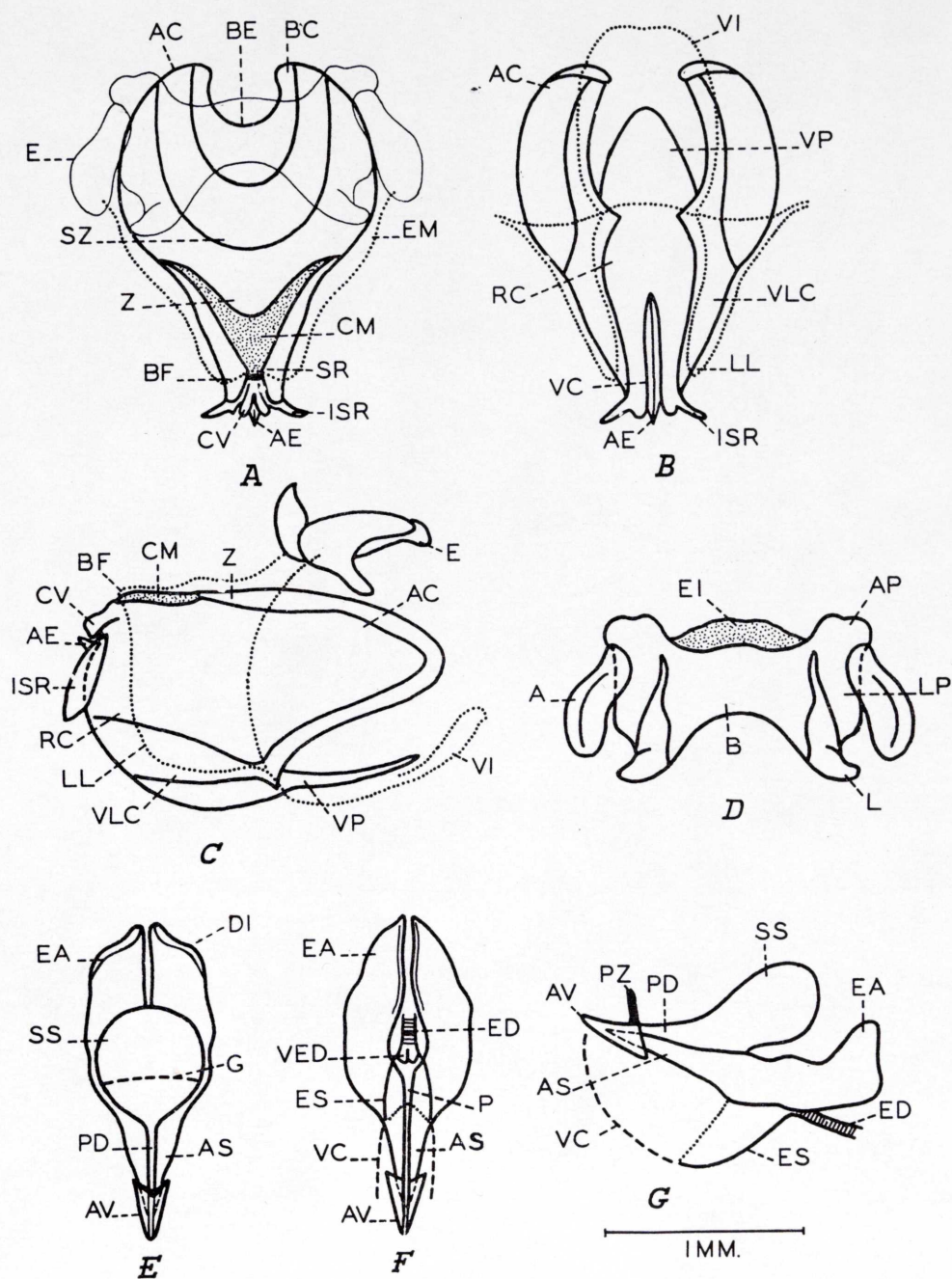


Fig. 53.—*Pyrgomorphini* (*Parasphenina*): *Pezotagasta angolensis* (Rehn), phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.

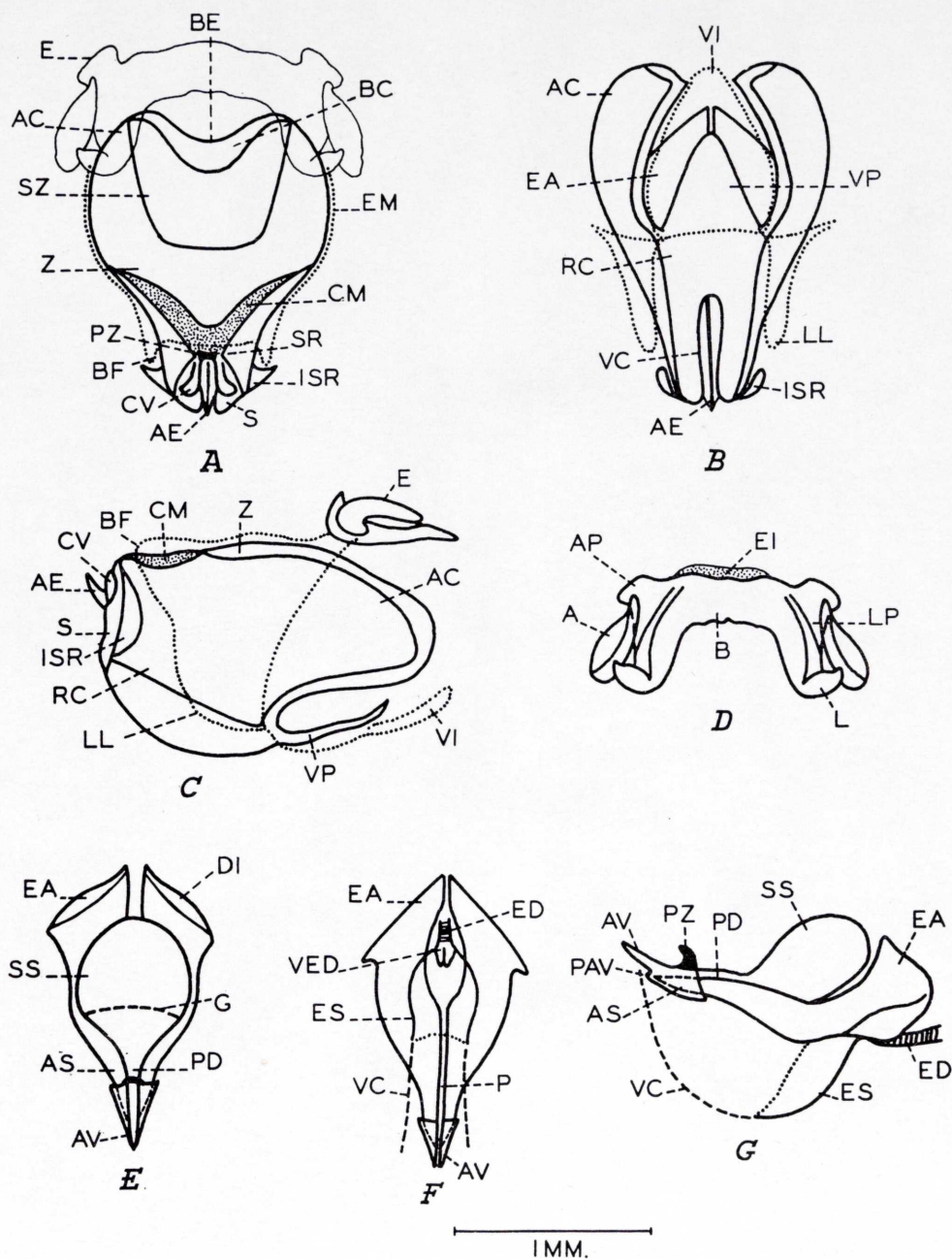
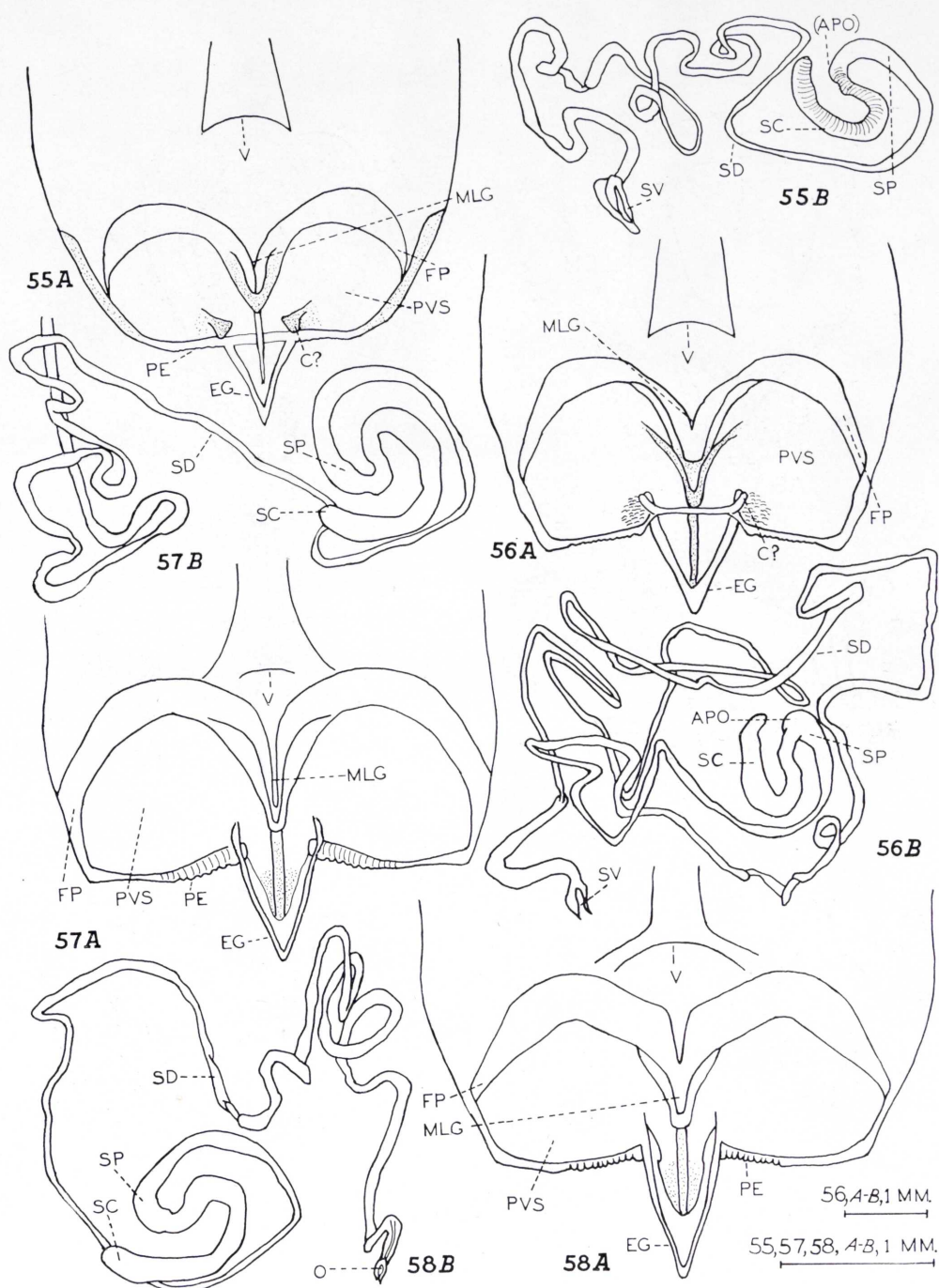


Fig. 54.—*Pyrgomorphini* (*Parasphenina*): *Parasphenula yemenita* (Uvarov), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.



Figs. 55-58.—Pyrgomorphini (Parasphenina), female structures: 55) *Parasphenula pulchripes* (Gerstaecker); 56) *Pezotagasta angolensis* (Rehn); 57) *Parasphenula boranensis* (Salfi); 58) *P. picta* (Bolivar). A, B, as in Figs. 4-6. For notation, see pp. 199-201.

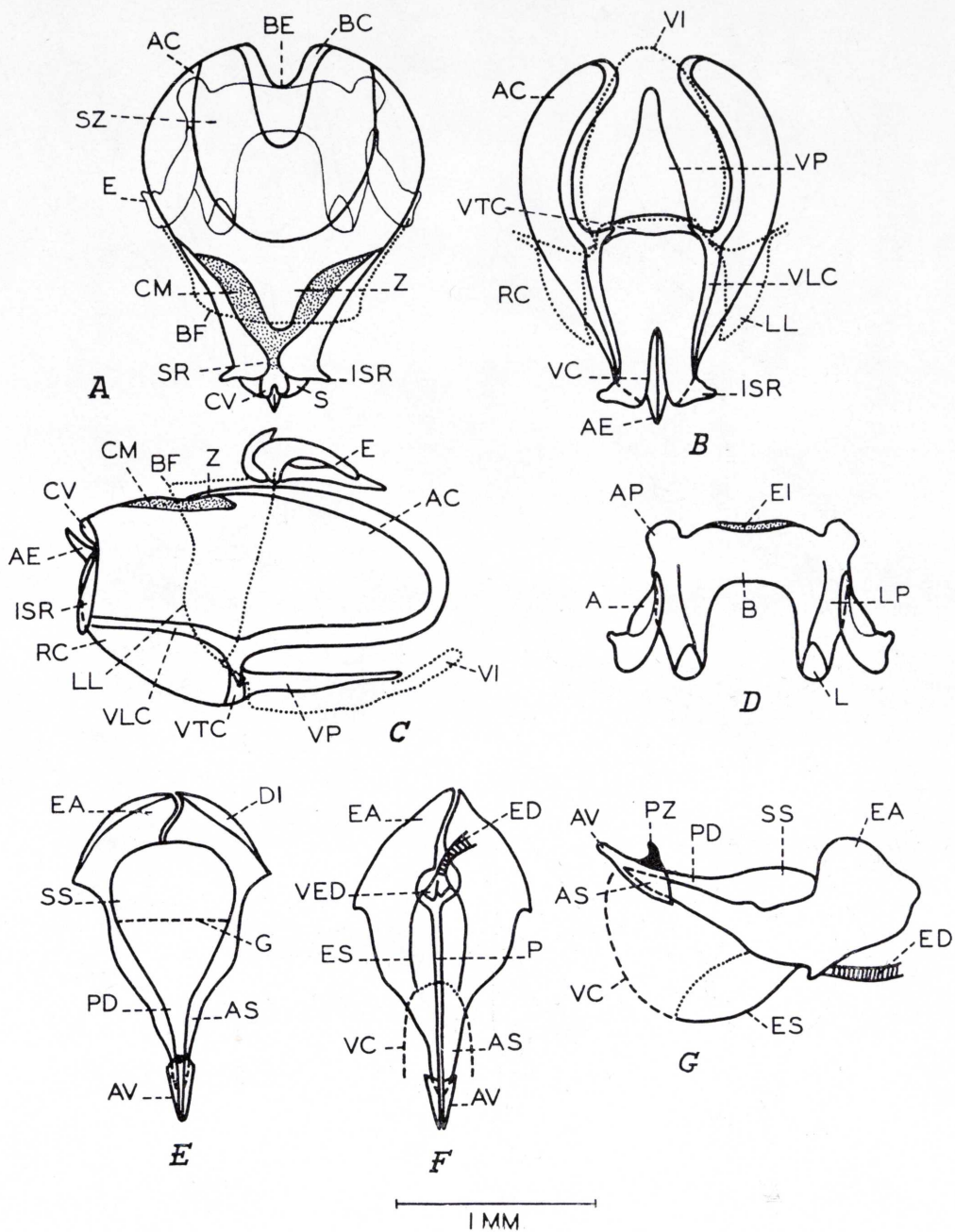


Fig. 59.—Pyrgomorphini (Parasphenina): *Afrosphenella gracilis* Kevan, phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.

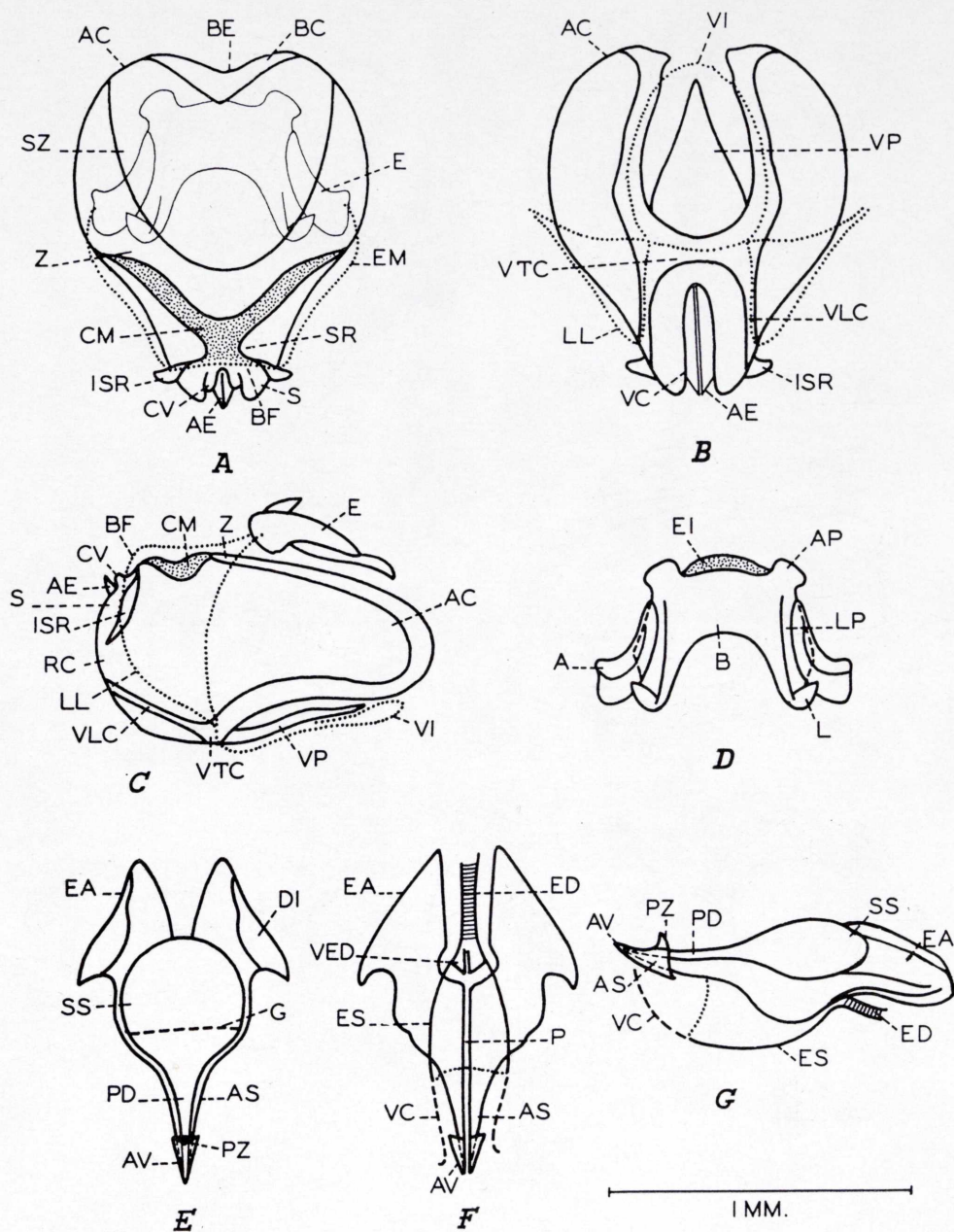


Fig. 60.—*Pyrgomorphini* (*Parasphenina*): *Afrosphenella capensis* (Key), phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.

as the former has reduced externolateral expansions on the epiphallus, and the latter is without columellae on the female subgenital plate (which is, however, of specialized form). In external morphology, *Punctisphenella* and *Carinisphenella* are also intermediate, but their concealed copulatory structures are quite typical of *Pyrgomorphina*. It would thus appear that the two subtribes are somewhat artificial, although most of the genera may readily be assigned to one or the other.

No recent revision of all members of the subtribe has been published, but the contributions of Kevan (1948, 1956, 1961, 1962 c, 1966), Kevan and Akbar (1963) and Dirsh (1966) cover almost all species. Dirsh (1961) has, we believe incorrectly, synonymized several of the genera so that his key to genera (Dirsh, 1965) has distinct limitations, and his lists of species are not entirely accurate.

There is little previous information on the male genitalic apparatus and none on the female structures. Dirsh (1956, 1965) illustrates the epiphallus of *Parasphenella pulchripes*; Kevan and Akbar (1963) figure the phallic structures of *Afrosphenella capensis* and discuss those of *A. senecionicola*; and Kevan (1966) depicts those of *Parasphenella carinata* and *P. meridionalis*.

Subtribe c. ARBUSCULINA nov.

(Figs. 63, 64).

Subfam. *Desmopterinae* Bolívar, 1905, *Bol. Soc. esp. Hist. nat.*, V, 105 (*partim*).

Sect. *Desmopterae* Bolívar, 1909, *Gen. Ins.*, XC, 4, 34 (*partim*).

Subtribe *Pyrgomorphina* Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1509, fig. 3 (map), 1514, 1526 (*partim*).

External features (of single known species): Body elongate-fusiform, slightly depressed; integument with longitudinal plicae and striations; colour (so far as known) pale brownish; antennae (at least in ♂) short, triquetrous, with segments of distal half fused; head elongate-conical, vertex not convex in lateral view, frontal profile very strongly oblique and slightly concave, fastigium of vertex comparatively long; all three carinae of pronotal disc strong, lateral pronotal lobe with a strong oblique ridge; tegmina and hind wings absent.

Principal phallic characters: Epiphallus with moderately narrow

bridge, large anterior projections, lateral plates of moderate width having narrow, rounded externolateral expansions, and short posterior projections extending beyond the lophi, latter directed dorsolaterally, appendices rather long; ectophallus rather parallel-sided, central membrane not well differentiated from zygoma, transverse, posterior margin of zygoma transverse, suprazygomal plate narrow, tongue-like, no wider than basal thickening, latter rather small, subcircular; endophallic apodemes without prominent or backwardly directed dorsal inflections, aedeagal valves long and sabre-like in lateral view, without ventrolateral pockets, spermatophore sac elongate-oval, gonopore near the middle, pseudoarch indistinct.

Concealed female structures: Subgenital plate unusually narrow with posterior edge transverse and finely serrated, egg-guide acutely triangular with distinct columella-like structures at the base, transverse areas resembling contact areas distinguishable in front of posterior edge; spermatheca without an apical pocket, caecum with a small thumb-like apical appendage.

Distribution: Indo-China.

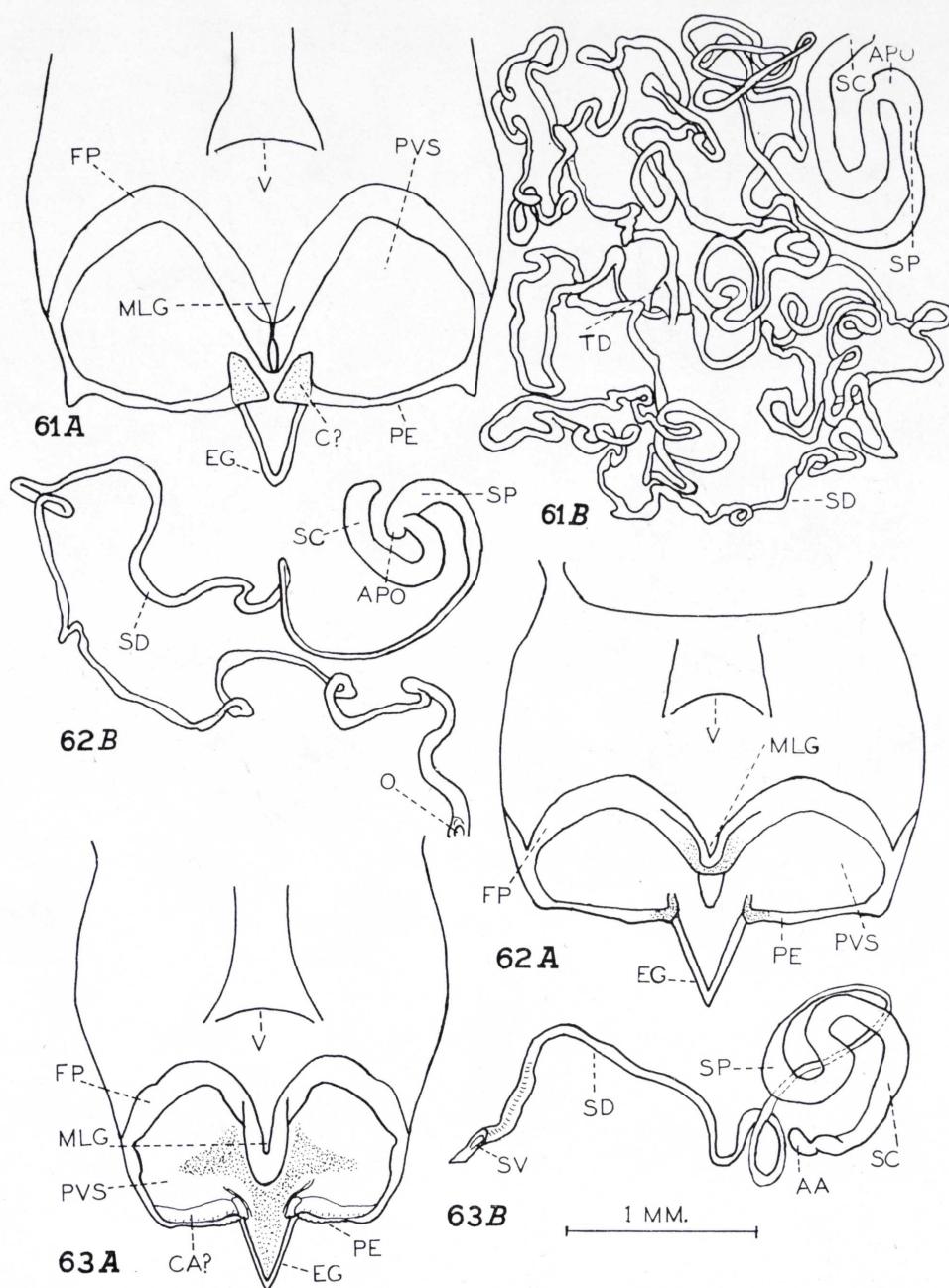
Included genus: *Arbuscula* Bolívar, 1905.

Species examined: *Arbuscula cambodjiana* Bolívar, 1905 (Cambodia, Laos — Figs. 63, 64) [Type species].

Other species: None known.

This subtribe is known only by the female holotype and a single male of the only described species (Kevan, 1968 b). As previously mentioned, the geographical distribution is anomalous for *Pyrgomorphini*, and the same is true for the concealed copulatory structures. In the female, for example, the peculiar, short appendage to the caecum of the spermatheca is unique for the tribe (and is probably a relict character); and in the male, the epiphallus is rather characteristic and the aedeagal valves are of an unusual form. Relatively long aedeagal valves are, however, found in other *Pyrgomorphini*, such as *Lepte* and some species of *Pyrgomorpha*. The endophallic apodemes, in lateral view, are not unlike those of the *Lepte* and *Tanita*, but the spermatophore sac is unusually narrow. The ectophallus has a comparatively narrow suprazygomal plate and greatly expanded supramami, although a condition comparable with the latter may be found in other *Pyrgomorphini*, for example, in *Zarytes* and *Anarchita* (geographically the nearest relatives of *Arbuscula*).

Among *Pyrgomorphini*, *Arbuscula* would seem to come nearest in



Figs. 61-63.—Pyrgomorphini (*Parasphenina* and *Arbusculina*), female structures: 61) *Afrosphenella picticeps* (Bolivar); 62) *Afrosphenella capensis* (Key); 63) *Arbuscula cambodjiana* Bolivar, holotype. A, B, as in Figs. 4-6. For notation, see pp. 199-201.

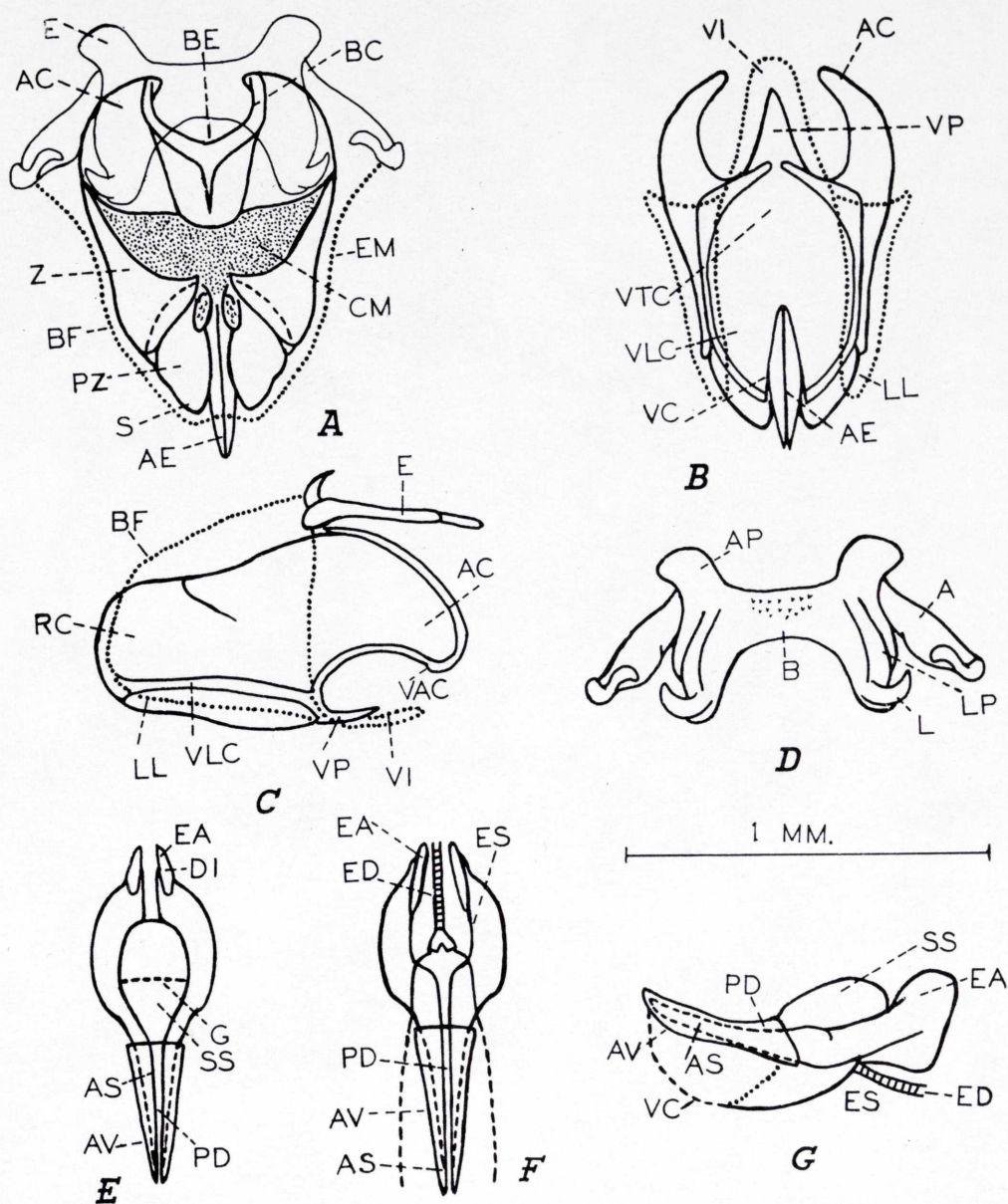


Fig. 64.—*Pyrgomorphini* (*Arbusculina*): *Arbuscula cambodjiana* Bolívar, phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.

external morphology to *Anarchita*, but of all *Pyrgomorphidae* the closest superficial resemblance is to the Brazilian genus *Algete* (*Omurini*), although the phallic structures show the two to be quite unrelated. It is difficult to suggest why Bolívar (1905, 1909) placed *Arbuscula* in the *Desmopterini*, from which it was removed by Kevan (1963 a), as there is no close superficial resemblance to members of that tribe, and certainly none in the concealed copulatory structures. These are figured for *Arbuscula* by Kevan (1968 b).

Subtribe *d.* GELOIODINA nov.

(Fig. 65; Pl. XIV, figs. K, L).

Subtribe *Pyrgomorphina* Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1509, fig. 3 (map), 1524, 1526 (*partim*).

External features (of single known species): Body rather strongly fusiform, somewhat compressed; integument strongly rugose; colour brownish (so far as known); antennae (at least in ♀) triquetrous, somewhat serrated, doubly pointed apically; head strongly conical, vertex but little arched above in lateral view, frontal profile strongly oblique and deeply excavated, fastigium of vertex rather long; lateral carinae of pronotal disc strong, lateral pronotal lobe with a distinct oblique ridge; tegmina and hind wings absent.

Principal phallic characters: Unknown.

Concealed female structures: Subgenital plate with posterior margin rounded, smooth, egg-guide short, with columella-like thickenings at the base, but no true columellae, contact areas not defined; spermatheca S-shaped, without an apical pocket, caecum continuous with the spermathecal vesicle, its apex curved inwards.

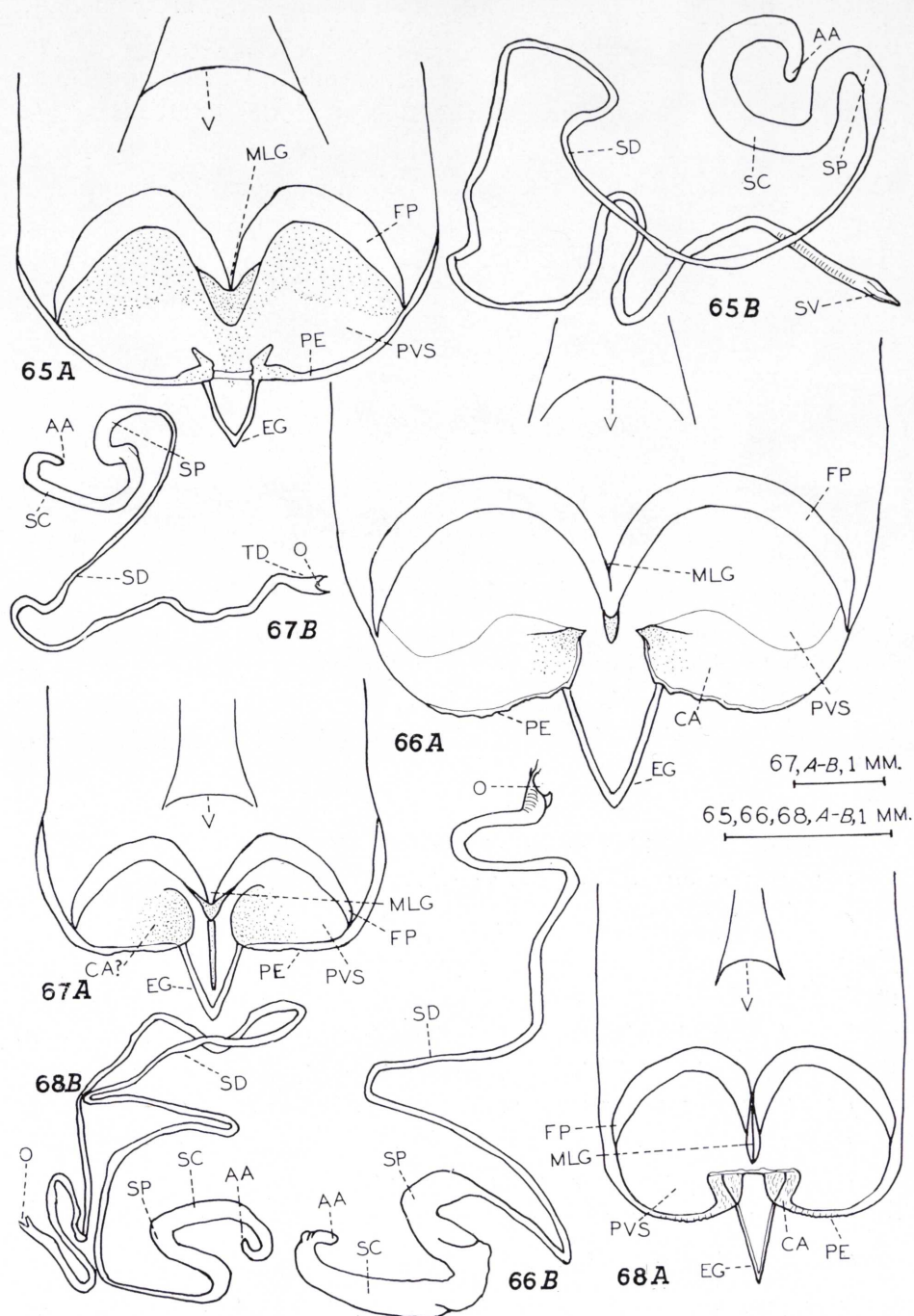
Distribution: West Africa (St. Thomas and Prince Is.).

Included genus: *Geloiodes* Chopard, 1958 [only female known].

Species examined: *Geloiodes cavifrons* Chopard, 1958 (São Tomé — Fig. 65; Pl. XIV, figs. K, L) [Type species].

Other species: None known.

It is possible that *Geloiodes* may be related to *Chrotogonini*, for, although members of that tribe have somewhat or very depressed bodies, and most of them have short fastigia vertices, the external morphology of *Geloiodes*, with its rugose integument, prominent fastigium



Figs. 65-68.—Pyrgomorphini (*Geloiodina*) and *Chrotogonini*, female structures: 65) *Geloiodes cavifrons* Chopard, holotype; 66) *Caconda fusca* Bolivar; 67) *Stibarosterna serrata* Uvarov, paratype; 68) *Tenuitarusus angustus* (Blanchard). A, B, as in Figs. 4-6. For notation, see pp. 199-201.

and excavated frons, is reminiscent of a less robust, somewhat compressed *Caconda*. The apices of the antennae are also rather chrotonine and the spermatheca differs from all other *Pyrgomorphini*, and agrees with *Chrotogonini*, in that the apex of the caecum is inwardly curved. The apex of the caecum is not, however, narrowed as in the latter tribe, and the antennae are not otherwise specialized in the manner of *Chrotogonini*. Pending the discovery of a male, therefore, *Geloiodes* is best retained in the *Pyrgomorphini*.

The only published account of *Geloiodes* is that of Chopard (1958). Besides the holotype, only one specimen is known: 1 ♀, "West Africa, São Thomé I., 3.xi.32, W. H. T. Tams" [British Museum (Natural History)]. The female structures have not previously been described.

TRIBE 30. CHROTOGONINI.

(Figs. 65-77).

- [Famille *Acridites*, Division *Acridites* propre dicti, Sousdivision] Mutici Audinet-Serville 1838, *Hist. nat. Ins. Orth.* [= *Coll. Suites à Buffon* (7)], 569, 702 (*partim*).
- [Familie Acridien] Unterfamilie Mutici Burmeister, 1840, *Z. Ent. (German)*, II, 43.
- [Geslacht *Acridium* Groepen] *Ommexecha* and *Chrotogonus* Haan, 1842, *In* Temminck, *Verh. natuurl. Gesch. Ned. overz. Bezitt.*, XVIII (Zool. 7): 145 [*Ommexecha* only] (*partim*), 146 [*Chrotogonus* only].
- [Fam. *Acrididae*] Limited Fam. *Oedipodidae* Walker, 1870, *Cat. Derm. Salt. Brit. Mus.*, IV, 721 (*partim*).
- Fam. *Oedipodidae* Walker, 1870, *Zoologist* (2), V, 2299 (*partim*); 1871, *Cat. Derm. Salt. Brit. Mus.*, V (Suppl. 3): 102 (*partim*).
- Sub-tribus [and "sub-tribu"] *Chrotogonae* Bolívar, 1884, *An. Soc. esp. Hist. nat.*, XIII, 20, 21, 35 [see also Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1508; Akbar, 1968, *Sind Univ. Res. J. (Sci.)*, III, 123].
- Oedipodiens* (*partim*), Saussure, 1889, *Mitt. schweiz. ent. Ges.*, VIII, 87.
- Podsemeistvo *Chrotogonini* Yakobson, 1902, *In* Yakobson and Bianki, *Pryamokr. Lozhnosétchatokr. Ross. Imp.*, 171, 288.
- Subfam. *Chrotogoninae* Kirby, 1902, *Trans. ent. Soc. London*, 1902, 77; Bolívar, 1904, *Bol. Soc. esp. Hist. nat.*, IV, 90 [see also Akbar, 1968, *Sind. Univ. Res. J. (Sci.)*, III, 125].
- Sect. *Chrotogoni* Bolívar, 1909, *Gen. Ins.*, XC, 3, 5.
- Section *Chrotogoni* Uvarov, 1922, *Ann. Mag. nat. Hist.* (9), IX, 111.
- Group *Chrotogoni* Powers, 1942, *J. Morph.*, LXXI, 526; Uvarov, 1953, *Publ. cult. Diamang.*, XXI, 204; Johnston, 1956, *Annot. Cat. Afr. Grassh.*, 108.

- Groupe *Chrotogoni* Chopard, 1943, *Fauna Emp. franç.*, I, 60.
- Sousfamille *Chrotogoninae* Chopard, 1949, In Grassé, *Traité Zool.*, IX, 710 [see also Kevan, 1961, *Syst. Zool.*, X, 99].
- Tribe *Chrotogonini* Rehn, 1953, *Grassh. Locusts Austral.*, II, 24, 28; Kevan, 1961, *Ent. mon. Mag.*, XCVI, 204; 1963, *Eos*, Madrid, XXXIX, 549, 550; Kevan and Akbar, 1964, *Canad. Ent.*, XCVI, 1507, 1509, fig. 3 (map), 1517, 1526; Akbar, 1966, *Sind Univ. Res. J. (Sci.)*, II, 5; 1968, *ibid.*, IV, 126; Kevan, Akbar and Chang, 1969, *Eos*, Madrid, XLIV (1968), 176, 200, 205, 218; 1970, *ibid.*, XLV (1969), 177, 200; Kevan, 1970, *Acrid. Abstr.* (n. s.) 1970, 47; 1970, *Abstr. Ent.*, I, 524; Akbar, 1971, *Sind Univ. Res. J. (Sci.)*, V, 93, 95.
- Podčeled' *Chrotogoninae* Obenberger, 1955, *Entomologie*, Praha, II, 297, 329.
- Chrotogonini* Kevan, 1957, *Tijdschr. Ent.*, C, 60; 1959, *Publ. cult. Diamang.*, XLIII, 11, 13-15, 18-24, 40, 189, 201, 203-206, 210-211, 232, 241, 243, 245; Banerjee and Kevan, 1962, *Eos*, Madrid, XXXVIII, 421; Kevan, 1966, *Opusc. ent.*, XXXI, 207; Kevan and Akbar, 1966, *Acrid. Abstr.*, 1966, 14; Kevan, 1968, *Ent. mon. Mag.*, CIV, 10, 14.
- Tribus *Chrotogonini* Kevan and Knipper, 1959, *Z. Tierpsychol.*, XVI, 269; 1961, *Beitr. Ent.*, XI, 370; Weidner, 1962, *Abh. Verh. naturwiss. Ver. Hamburg* (N. S.), VI (1961), 88.

External features: Body never very large, only rarely fusiform, usually depressed; integument usually strongly rugose, occasionally with longitudinal plicate tubercles; coloration brownish or greyish, usually mottled, never green; antennae cylindrical with terminal segments incrassated, fused, or partly so, often pitted, apex truncated, head usually blunt, although occasionally conical, frontal profile not usually oblique though sometimes so, fastigium of vertex usually very short and blunt, occasionally long or subacute; pronotum in dorsal view very strongly divergent posteriorly, lateral carinae present on disc; sternal lamina wide, prosternum with reflexed, collar-like anterior margin and a 'double' tubercle; mesosternal lobes not divergent distad, their interspace usually as wide as or wider than a lobe; tegmina and hind wings very variable in degree of development, sometimes altogether lacking, longitudinal veins of tegmina, when latter developed, with small nodules along their length, hind wings, if present, colourless, faintly bluish or infumated, never distinctly coloured.

Principal phallic characters: Epiphallus of fairly conventional shape, but bridge comparatively slender, lateral plates short and wide at the base, externolateral expansions always present but often quite poorly developed and never acutely angled, lophi usually long, very strong and laterally directed; ectophallus broadly pyriform, central membrane

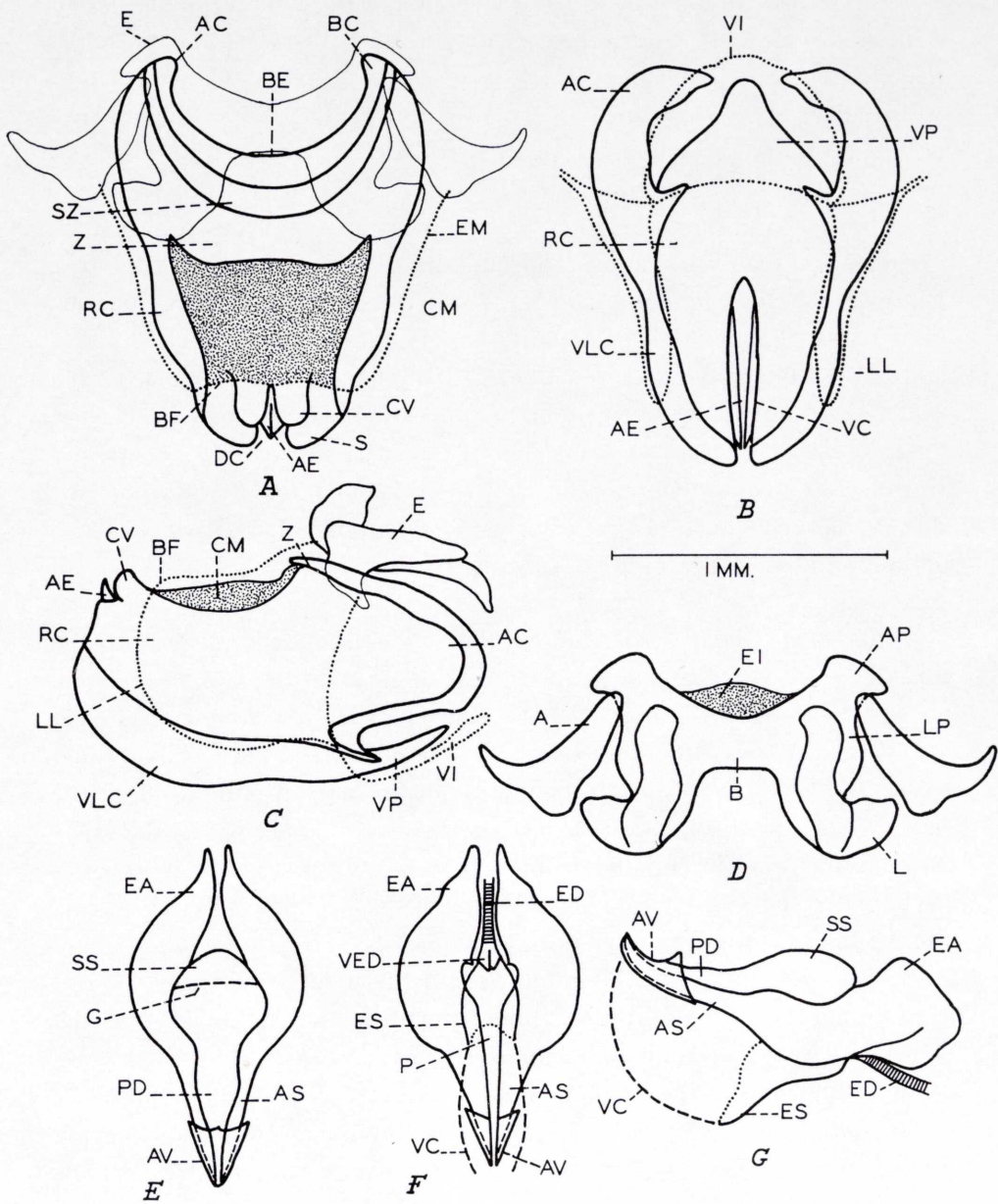


Fig. 69.—*Chrotogonini*: *Stibarosterna serrata* Uvarov, paratype, phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.

extensive, occupying the greater part of the dorsum of the posterior region of the ectophallus, zygoma broad and simple, its posterior margin convex or truncated; suprazygomal plate wide, semicircular or with a trapezoidal posterior extension, usually reaching the posterior margin of the zygoma or nearly so; basal emargination semicircular or subcircular, rather wide and usually fairly deep, apodemal plates narrowly rounded or bluntly pointed in lateral view, without ventral processes, valves of cingulum well developed, broad or finger-like in dorsal view, rami of cingulum rather narrow and not strongly convergent in dorsal view, suprarami and sheaths poorly or not developed, ventral process of cingulum very broad, obtusely angular or rounded in front; aedeagal sclerites usually rather short and stout, endophallic apodemes rather rounded or somewhat angular in lateral view, dorsal inflection poorly developed, ventral processes usually absent, spermatophore sac of somewhat variable form but usually pyriform, sometimes transversely ovoid, gonopore near or before the middle, phallotreme duct sometimes enlarged anteriorly, pseudoarch very small, aedeagal valves usually ensheathing at least two fifths of the terminal parts of the 'aedeagal sclerites', slightly curved upwards apically.

Concealed female structures: Subgenital plate with posterior edge transverse or biarcuate, smooth or but slightly serrated or crenulated, egg-guide usually prominent and rather narrowly triangular, contact areas weakly indicated or absent, true columellae lacking, but quite extensive, thickened or rugose areas often present on either side of the base of the egg-guide; spermatheca S-shaped, the spermathecal vesicle and caecum undifferentiated from each other, apex of caecum bearing a characteristic curved finger-like appendix which probably represents the vestiges of the spermathecal appendage, spermathecal duct generally rather stout, terminal dilation small or virtually lacking.

Distribution: Virtually the whole of Africa (except for the extreme southwest and the Mediterranean northwest), SW. Asia to Pakistan, India, Bangladesh and Ceylon, Central Asia to NE. China.

Included genera: *Caconda* Bolívar, 1884 [= *Moxicus* Kevan, 1959 — no mature male known]; *Stibarosterna* Uvarov, 1922; *Tenuitarsus* Bolívar, 1904; *Chrotogonus* Audinet-Serville, 1838 (including subgenus *Obbiacris* Kevan, 1952); *Shoacris* Kevan, 1952.

Species examined: *Caconda fusca* Bolívar, 1884 [= *plicatula* Bolívar, 1904] (SW. Angola — Fig. 66) [Type species]; *Stibarosterna serrata* Uvarov, 1953 (S. Angola — Figs. 67, 69) [Type species];

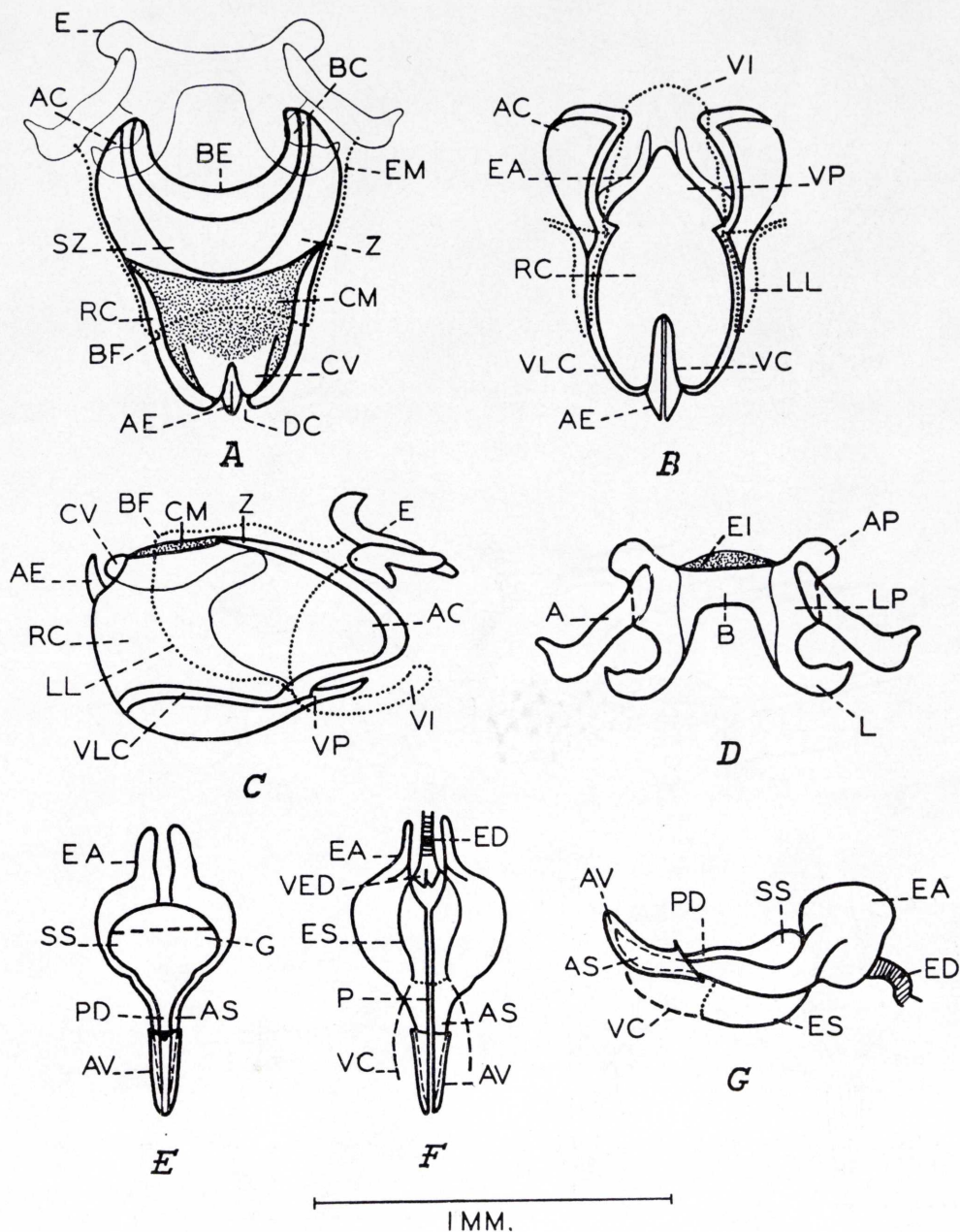


Fig. 70.—*Chrotogonini*: *Temutarsus angustus* (Blanchard), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.

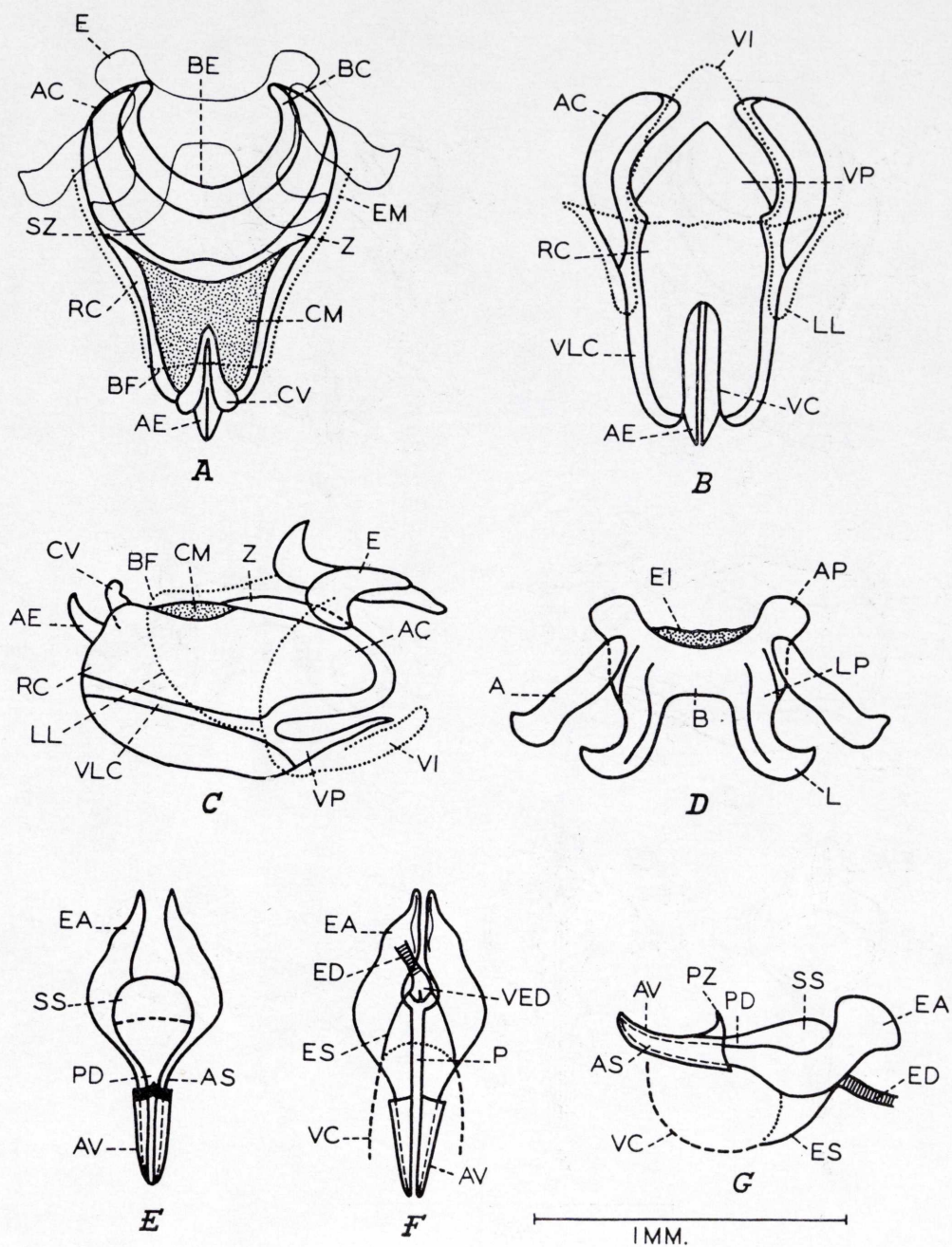


Fig. 71.—*Chrotogonini*: *Chrotogonus (Obbiacris) tuberculatus* Kevan, paratype, phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.

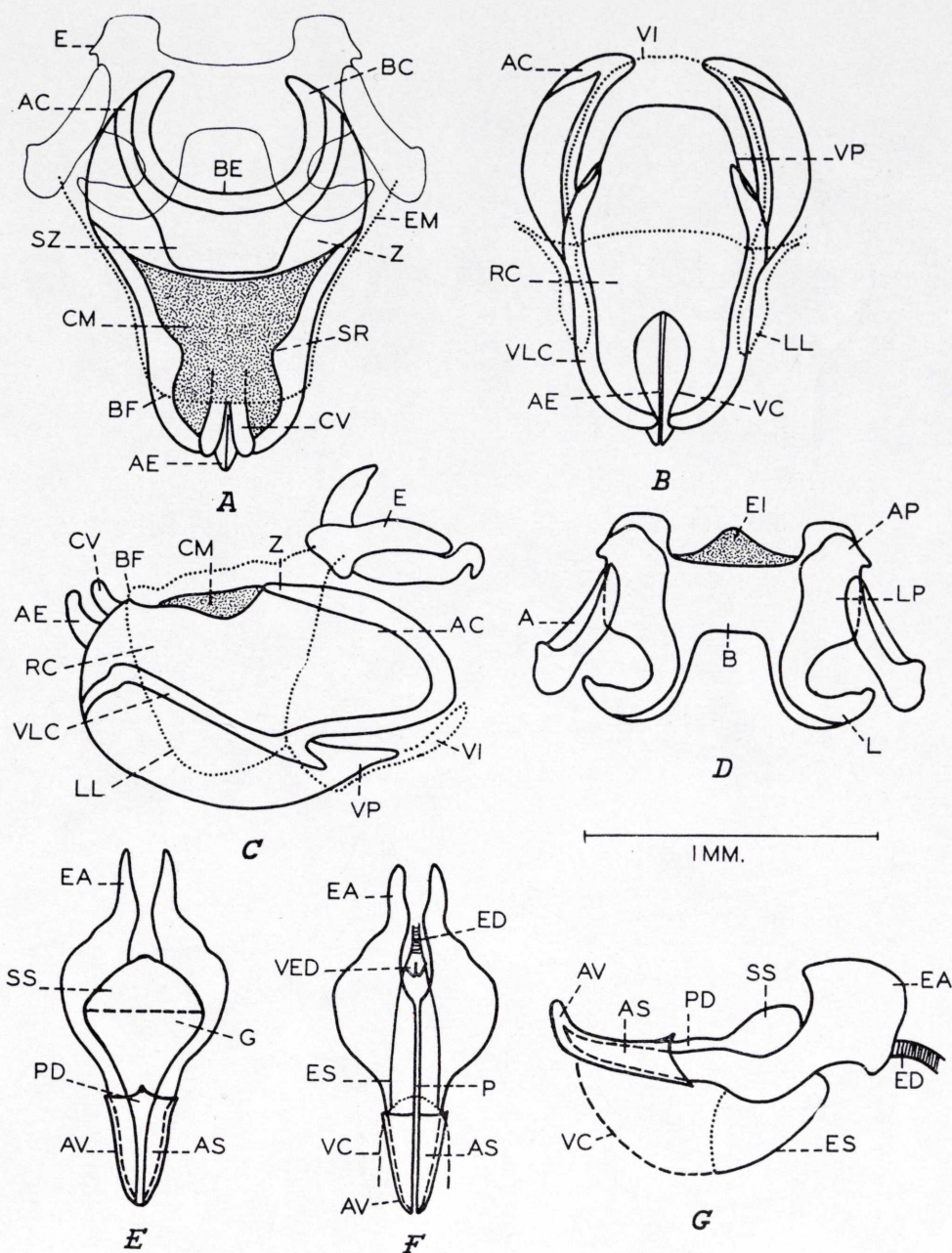


Fig. 72.—*Chrotogonini*: *Chrotogonus* (*Chrotogonus*) *hemipterus* Schaum, phallic structures. A-G, as in Fig. 1. For notation see pp. 199-201.

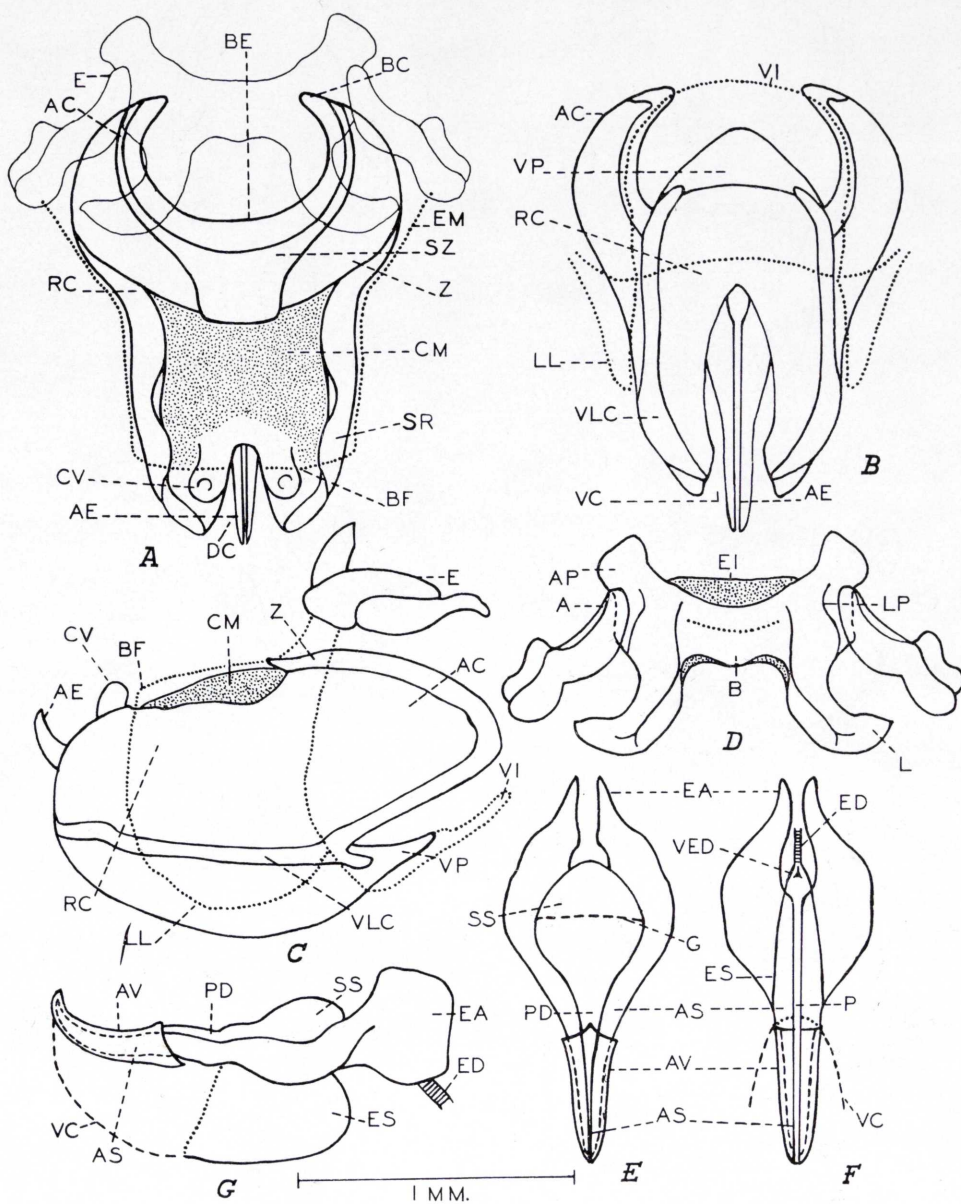


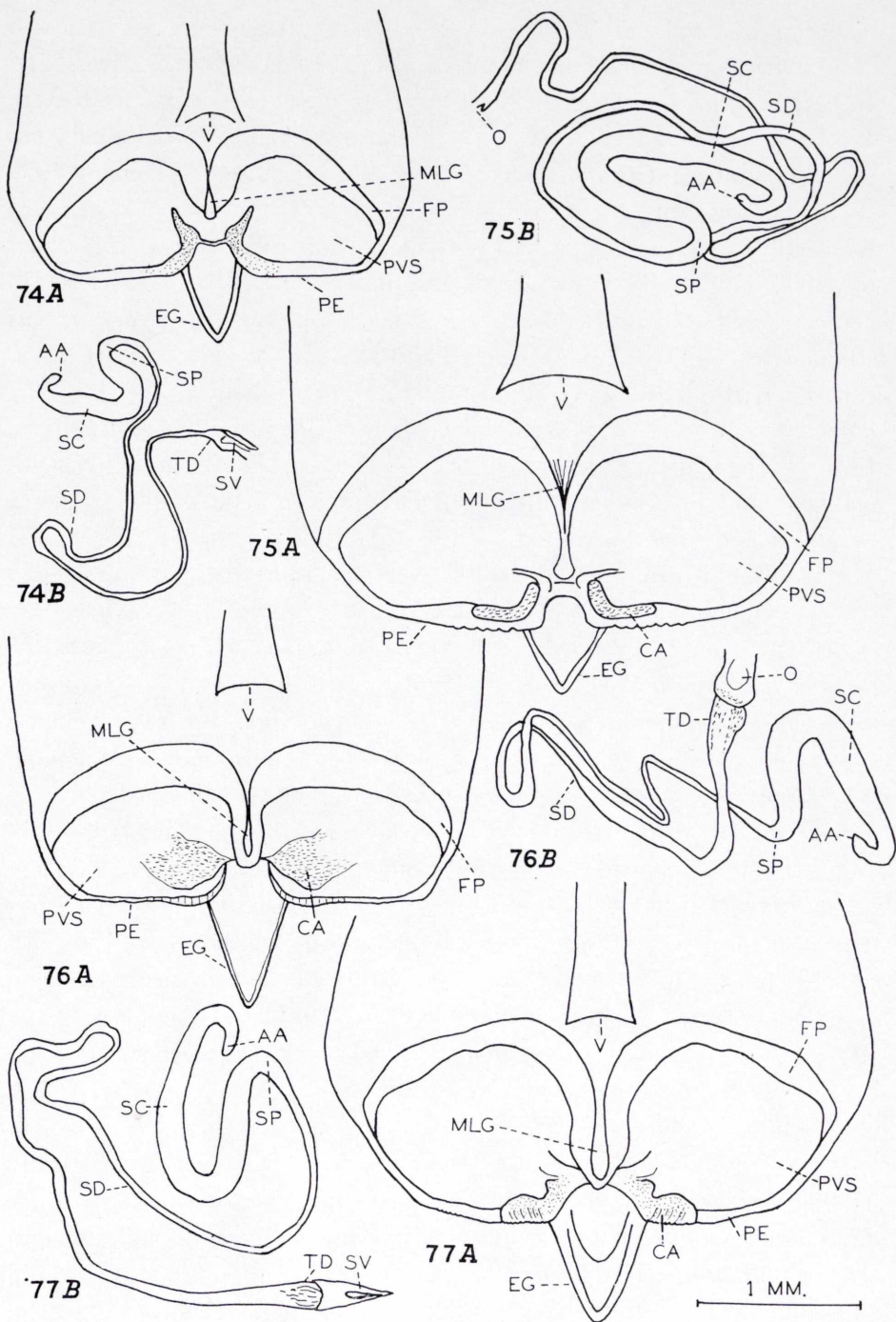
Fig. 73.—*Chrotogonini*: *Shoacris bormansi* (Bolívar), phallic structures. A-G, as in Fig. 1. For notation, see pp. 199-201.

Tenuitarsus angustus (Blanchard, 1836) (arid areas of NW. Africa to NE. Africa including the Somalilands, SW. Asia to S. Iran and E. Baluchistan — Figs. 68, 70) [Type species]; *T. sudanicus* Kevan, 1953 (Sudan to N. Nigeria); *T. orientalis* Kevan, 1959 (Baluchistan to NW. India); *Chrotogonus (Obbiacris) tuberculatus* Kevan, 1959 (Somalia, Ogaden, N. Kenya — Figs. 71, 74); *Ch. (O.) arenicola* Kevan, 1952 (S. Somalia) [Type species of subgenus]; *Ch. (Ch.) turanicus* Kuthy, 1905 [= *skopini* Steinmann, 1965 = *russicus* Steinmann, 1965] (Central Asia); *Ch. (Ch.) trachypterus trachypterus* (Blanchard, 1836) (C. and N. India, Pakistan, Nepal); *Ch. (Ch.) t. robertsi* Kirby, 1914 (NW. Pakistan, E. Iran, Afghanistan); *Ch. (Ch.) homalodemus homalodemus* (Blanchard, 1836) [= *lugubris* (Blanchard, 1836)] (Baluchistan to Arabia, Egypt, Sudan, E. Ethiopia, N. Somaliland and in scattered areas on the southern fringe of the Sahara to Niger and (?) Mauritania — Fig. 75) [Type species]; *Ch. (Ch.) h. somalicus* Kevan, 1959 (Somalia, except N., and arid parts of Kenya and N. Tanganyika); *Ch. (Ch.) senegalensis brevipennis* Kevan, 1959 (drier parts of W. Africa); *Ch. (Ch.) s. senegalensis* Krauss, 1877 (less dry parts of W. Africa to E. Zaïre, Burundi and N. Zambia); *Ch. (Ch.) s. sudanicus* Kevan, 1959 (S. and E. Sudan to NW. Kenya); *Ch. (Ch.) s. abyssinicus* Bolívar, 1904 (Ethiopia, Kenya, Uganda, NE. Congo); *Ch. (Ch.) s. gabonicus* Bolívar, 1904 (elevated parts of Guinea and Sierra Leone); *Ch. (Ch.) hemipterus* Schaum, 1853 (southern and eastern Africa to E. Congo — Figs. 72, 76); *Ch. (Ch.) oxypterus* (Blanchard, 1836) (NE., C. and S. India, Ceylon); *Shoacris bormansi* (Bolívar, 1884) (C. and E. Ethiopian highlands — Figs. 73, 77) [Type species], new eastern record from Coralei near Jigjigga.

Other species: *Caconda burri* Kevan, 1951 (E. Angola) [Type species of *Moxicus*]; *Chrotogonus (Ch.) armatus* Steinmann, 1965 [= *changi* Steinmann, 1965] (NE. China).

Members of this tribe are very easily recognized, but they probably have a common origin with the *Pyrgomorphini*, characteristically having special adaptations, such as a strongly depressed body form, associated with life under more arid conditions (although several species and subspecies of *Chrotogonus*, s. str., are found in more humid situations). The group has been thoroughly monographed by Kevan (1959), his work having been more recently updated (Kevan, 1963 b, 1968 a, 1968 c).

Some of the phallic structures have been illustrated by Roberts



Figs. 74-77.—*Chrotogonini*, female structures: 73) *Chrotogonus* (*Obbiacris*) *tuberculatus* Kevan, paratype; 74) *Ch.* (*Chrotogonus*) *homalodemus homalodemus* (Blanchard); 75) *Ch.* (*Ch.*) *hemipterus* Schaum; 76) *Shoacris bormansi* (Bolívar), holotype. A, B, as in Figs. 4-6. For notation, see pp. 199-201.

(1941) for *Chrotogonus trachypterus* [*trachypterus*], and his figure of the epiphallus is reproduced by Uvarov (1948). Kevan (1952, 1953) figures the epiphalli and aedeagi of *Ch. (Obbiacris) arenicola* and *Tenuitarsus angustus*, discussing also the variation in the latter species and in *T. sudanicus*. Dirsh (1953, 1956, 1965) illustrates the epiphallus of *Chrotogonus* sp. and *Ch. homalodemus* [presumably all = *Ch. h. homalodemus*], and the same author (Dirsh, 1956, 1965) figures the same structure for *Tenuitarsus angustus* [earlier reference as *Tenuitarsus* sp.] and *Stibarosterna serrata*. Kevan (1959) also illustrates the epiphallus, as well as the aedeagus, while Dirsh (1966) provides sketches of all the principle phallic structures for the last species. Akbar (1966) shows the epiphallus of *Chrotogonus* [*tr. trachypterus*], and Kevan (1968c) illustrates the epiphalli, ectophalli and aedeagi of all species of that genus except *Ch. armatus*, those for *Ch. hemipterus* being rather similar in detail to those presented here.

The concealed female structures have been less studied, but the spermatheca is illustrated by Slifer (1950) for *Chrotogonus* sp. [probably *Ch. tr. trachypterus*] and her figure is repeated by Beĭ-Bienko (1951, 1963). Katiyar (1956) also figures the spermatheca of what he calls *Ch. concavus* [= *Ch. tr. trachypterus*], while Kevan (1952, 1953, 1959) illustrates those of *Ch. (Obbiacris) arenicola*, *Tenuitarsus angustus* and *Stibarosterna serrata*, discussing also (Kevan, 1953) variation and the spermatheca of *T. sudanicus*. Previous information on the dorsal aspect of the female subgenital plate is confined to a mention of some of its features in *Chrotogonus senegalensis* [*brevipennis*] by Agarwala (1954) and a figure for *Chrotogonus* [*tr. trachypterus*] by Akbar (1966).

List of Abbreviations.

The following is a list, arranged alphabetically, of the abbreviations used in the illustrations.

A, Appendix of epiphallus.

AA, an apical appendix of the spermathecal caecum (? = vestigial spermathecal appendage).

AC, Apodemal, plate of cingulum.

AE, Aedeagus.

- AP, Anterior projection of epiphallus.
APO, Apical pocket of spermathecal vesicle.
AS, 'Aedeagal sclerite' (now seems homologous with Gonopore process of *Acrididae* and not with true aedeagal sclerite).
AV, Aedeagal valve.
B, Bridge of epiphallus.
BC, Basal thickening of cingulum.
BE, Basal emargination of cingulum.
BF, Basal fold of ectophallic membrane.
C, Columella of female subgenital armature.
CA, Contact area of female subgenital armature.
CM, Central membrane of ectophallus.
CV, Valve of cingulum.
DC, Dorsal cleft of cingulum.
DI, Dorsal inflection of endophallic apodeme.
E, Epiphallus.
EA, Endophallic apodeme.
ED, Ejaculatory duct.
EG, Egg-guide.
EI, Epiphallic infold.
EM, Ectophallic membrane.
ES, Ejaculatory sac.
FP, Floor pouch of female genital chamber.
G, Gonopore (male).
ISR, Inflection of ramus or supraramus.
L, Lophus of epiphallus.
LL, Lateral lobe of ectophallic membrane.
LOC, Lateral oblique thickening of cingulum.
LP, Lateral plate of epiphallus.
MLG, Median longitudinal groove of ovitract.
O, Orifice of spermathecal duct.
P, Phallotreme.
PAV, Ventrolateral process of an aedeagal valve.
PD, Phallotreme duct.
PE, Posterior edge of female subgenital plate.
PVS, Post-vaginal sclerite of female genital chamber.
PZ, Pseudoarch of ectophallus.
RC, Ramus of cingulum.
S, Sheath of ectophallus.

- SC, Caecum of spermatheca.
 SD, Spermathecal duct.
 SP, Spermathecal vesicle.
 SR, Supraramus of cingulum.
 SS, Spermatophore sac.
 SV, Valve of spermathecal duct.
 SZ, Suprazygomal plate of cingulum.
 TD, Terminal dilation of spermathecal duct.
 V, Vulva, or opening of vagina, or common oviduct, or female gonopore.
 VC, Ventral cleft of cingulum.
 VED, Valve of ejaculatory duct.
 VI, Ventral infold of ectophallic membrane.
 VLC, Ventral longitudinal thickening of cingulum.
 VOC, Ventral oblique thickening of cingulum.
 VP, Ventral process of cingulum.
 VTC, Ventral transverse thickening of cingulum.
 Z, Zygoma of cingulum.

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1948. Recent advances in acridology: anatomy and physiology of *Acrididae*. *Trans. R. ent. Soc. London*, t. XCIX [= *Anti-Locust Bull.* I], págs. 1-75.

EXPLANATION OF PLATES II-XIV:

PLATE II.

Pyrgomorphini (*Pyrgomorphina*): *Plerisca*, *Somalopyrgus* and *Pyrgomorphella* types:

Figs. A, B.—*Plerisca peringueyi* Bolívar, ♀ holotype, Geneva. The specimen is labelled only "Cap b. Esp." and bears Sausure's determination label "*Pyrgomorpha Peringueyi*", written in red.

Figs. C, D.—*P. rubripennulis* (Key), ♀ holotype, London. This specimen bears the following labels: (1) K. H. L. Key, Grahamstown, Cape Province, May 1931 (2) *Pyrgomorphella rubripennulis* Key, Type. Det. Key, 1936; (3) Type [red-bordered disc]; (4) Brit. Mus. 1936—5.

Figs. E, F.—The same, ♀ allotype, London. This has similar labels to the last except that (2) reads "Allotype", and (3) is yellow-bordered and reads "Paratype". Apart from the type locality, this species is also known to us from Port Elizabeth.

Figs. G, H.—*Somalopyrgus rotundipennis* Kevan, ♀ holotype, London. Owing to a transposition in printing that was not noticed when proofs were corrected, the measurements in the original description are erroneously given as the same as for the allotype; the correct measurements are: length of body 23.5, pronotum 4.0, tegmen 2.1, hind femur 11.5 mm.

Figs. I, J.—The same, ♂ allotype, London.

Figs. K, L.—*Pyrgomorphella sphenarioides* Bolívar, ♀ lectotype, Paris. This specimen bears the following labels: (1) Abyssinie; (2) *Pyrgomorphella sphenarioides* Bol. [Finot Collection label in Finot's, not Bolívar's, hand].

Figs. M, N.—The same, ♂ paralectotype, Paris. Labelled as last. There are also, in the Finot Collection, 3 ♀ ♀ paralectotypes with similar data, together with 2 ♀ ♀ labelled "Col. Erythrée Abyssinie". The latter are probably not syntypic. The only precise locality in Eritrea from which we know this species is Faghena.

PLATE III.

Pyrgomorphini (*Pyrgomorphina*): *Pyrgomorphella* types.

Figs. A, B.—*Pyrgomorphella albini* (Chopard), ♀ holotype, Paris. This bears the following labels: (1) Guaso Nyiro (Sud)

Sotik (B. E. A.); (2) G[uy] B[abault] Fév. 1913; (3) *Parasphena albini* n. sp. Type, L. Chopard det.; (4) Type [red on white].

Figs. C, D.—The same, ♂ holotype of *P. variegata* Key, London. This is labelled as follows: (1) Brit. E. Afr., Narosura, Masai Reserve, 2.11.1914, 6,500 ft., Capt. A. O. Luckman; (2) *Pyrgomorphella variegata* Key, Type, Det. Key 1936; (3) Type [red-bordered disc]; (4) 1914-521. The species is also known, not only from southern Kenya (Longonot Station, Longonot [Mt.], Naivasha, Ngong Escarpment and Pujon between Suswa and L. Magadi), but also from northern Tanganyika (north of Mt. Meru and Ngara Nanyuki [Sjöstedt's Kilimandjaro-Meru Expedition material determined as "*Parasphena dubia*"]).

Figs. E, F.—*P. arachidis* Dirsh, ♂ holotype, London. Labelled: (1) Tanganyika, Shinyanga, 20.III.47; (2) End March '47, Block 9 Shinyanga; (3) E. D. Burtt, B. M. 1948—39; (4) 90; (5) *Pyrgomorphella arachidis* sp. n. V. M. Dirsh det. 1956, Type!; (6) Type [red-bordered disc].

Figs. G, H.—*P. curtula* Uvarov, ♂ holotype, London. This is labelled: (1) Hadhramaut: Jol, c. 4000 ft., 1-3.xi.1949, G. Popov; (2) Presented by Anti-Locust Research Centre, B. M. 1949—622; (3) *Pyrgomorphella curtula* sp. n. Type, det. B. P. Uvarov, 1950; (4) Type [red-bordered disc].

Figs. I, J.—The same, ♀ paratype, London. Labelled: Hadhramaut: Jol, 10 ml. S. of Fort at top of Jobi Pass W. Road, 9.viii.1949, K. M. Guichard.

Figs. K, L.—*P. rotundata* Uvarov, ♀ holotype, London. This is labelled: (1) Arabia, S. Hejaz, Duka, 17.x.1931, H. St. J. B. Philby, B. M. 1931—549; (2) *Pyrgomorphella rotundata* sp. n. Det. B. Uvarov 1935; (3) Type [red-bordered disc].

PLATE IV.

Pyrgomorphini (Pyrgomorphina): Pyrgomorphella types.

Figs. A, B.—*Pyrgomorphella madecassa* Bolívar, ♂ paralectotype, Paris (Finot collection). This specimen is labelled as follows: (1) Madagascar; (2) Père Pantel dedit. It measures 12 mm. in length and is the only known male of the type series.

Figs. C, D.—The same, ♀ lectotype, Paris (general collection). This is labelled: (1) Museum Paris, Madagascar, Grandidier,

1902—92; (2) *Pyrgomorpha madecassa* Bol. I. Bolivar det. 1903. This specimen is the only one with Bolívar's determination label; it measures 18.5 mm. in length. There are three additional female paralectotypes in the Finot collection, labelled as in the male, one with the additional label "Madagascar, P. Cambour".

Figs. E, F.—*P. tulearensis* Descamps & Wintrebert, ♂ holotype, Paris. This is labelled: (1) Andronomena 8 km. N. [sic] Tuléar, 19.7.62, Madagascar sud, D. Wintrebert Reç.; (2) *Pyrgomorphella tulearensis* M. Descamps 1966. M. Descamps Det. 1966; (3) Holotype [on red].

Figs. G, H.—The same, ♀ allotype, Paris, with similar labels except for (3), which reads "Allotype".

Figs. I, J.—*P. dichrostachyae* Descamps & Wintrebert, ♂ holotype, Paris. This is labelled as follows: (1) Cap Ste. Marie 6.3.64/*Dicrostachys* sp. Madagascar sud, D. Wintrebert & J. Tetefort Reç.; (2) *Pyrgomorphella dichrostachyae* Descamps 1966, M. Descamps Det. 1966; (3) Holotype [on red].

Figs. K, L.—The same, ♀ allotype, Paris, with similar labels except for (3), which reads "Allotype".

Figs. M, N.—*P. minuta* Dirsh, ♂ paratype, London, labelled "Madagascar sud-ouest Amboasary 220 m. Ambovombe 19. vi.51, P. Griv." [the original description does not give these data exactly].

Figs. O, P.—The same, ♀ paratype, London. This has a similar label to the last but "Beloha 100 m. 20.vi.57". Another male paratype has a similar label but with "Andria R. vi. 57".

PLATE V.

Pyrgomorphini (*Pyrgomorphina*): *Phymelloides*, *Phymella*, *Zarytes* and *Anarchita* representative and type specimens.

Figs. A, B.—*Phymelloides rugosa* (Key), ♂ from 3 miles SE. of Calizord, Cape Province, South Africa; A', B', the same, ♀ from same locality [the holotype ♀ is in Cape Town and no photograph is available].

Figs. C, D.—*Phymella capensis* Uvarov, ♂ holotype, London. This is labelled "Herbert, Cape Province 15.v.1917" and bears Uvarov's determination and a red-bordered holotype disc.

Figs. E, F.—*Zarytes squalinus squalinus* (Bolivar), ♀ holotype, Vienna.

Figs. G, H.—*Zarytes s. brachycerus* (Kirby), ♀ holotype.

Fig. I.—The same, ♀ holotype of f. *mesopterus* Kevan.

- Fig. J.—The same, ♀ holotype of f. *micropterus* Kevan; details of *Zarytes* specimens are given by Kevan (1970).
 Figs. K, L.—*Anarchita aptera* (Bolívar), ♀ paralectotype (?), Paris.
 Figs. M, N.—The same, ♂ lectotype, Madrid.

PLATE VI.

Pyrgomorphini (*Pyrgomorphina*): *Leptea* and *Pyrgomorphula* types.

- Figs. A, B.—*Leptea debilis* (Finot), ♂ lectotype, Paris. This is labelled as follows: (1) Aïn-Sefra Algérie; (2) Brunner dedit.; (3) Collection A. Finot [printed]. *Orthacrella debilis*, Finot [in Finot's hand]; (4) Collection A. Finot *Pyrgomorpha debilis* Finot [all printed]; (5) Type du Dessin. It measures 12 mm. in length, as in the original description.
- Figs. C, D.—The same, ♀ paralectotype, Paris, labelled similarly to above and measuring 16 mm. as in the original description. There are also a male a female paralectotype without labels (4). There are also specimens from the type locality (? syntypes) in Geneva, Vienna and Leningrad. The species is also known from Delfa, Algeria.
- Figs. E, F.—*L. albotaeniata* (Werner), ♂ neotype [= *L. guichardi* Dirsh, holotype], London. This is labelled: (1) Tripolitania, Bianchi area 25 miles SW. of Tripoli 15.vi. 1951; (2) K. M. Guichard B. M. 1951—342; (3) *Leptea guichardi* sp. n. V. M. Dirsh det. 1951, Type !; (4) Type [red-bordered disc].
- Figs. G, H.—The same, ♀ paratype, same data but without indication of type status. There are also 1 ♂ and 1 ♀ paratypes similarly labelled and a series from Castel Benito. The species is also known from 5 ml. W. of Gargarese, Tripolitania.
- Figs. I, J.—*Pyrgomorphula serbica* (Pančić in Brunner von Wattenwyl), ♂ lectotype, Vienna. This is labelled as follows: (1) *P. serbica*? Coll. Br. v. W. Testiste: Serb. Dr. Pančić; (2) 13.055. It measures 19 mm. in length.
- Figs. K, L.—The same, ♀ paralectotype, Vienna. This is labelled: (1) *P. serbica*? Coll. Br. V. W. Uzienaer Kreis, Dr. Pančić; (2) 11.953. It measures 29 mm. There is also another female paralectotype with a similar label to (1) above, but "Rastiste Serb." and measuring 30.5 mm.
- Figs. M, N.—*Pyrgomorphula turcica* (Karabağ), ♀ holotype, London. The labels on this specimen are: (1) Turkey, Hakkâri: sem din li gübu koyü, ca. 1000 m., 15.viii.1952, T. Ka-

rabag; (2) *Pyrgomorphella turcica* sp. n. type det. T. Karabag 1960; (3) Type [red-bordered disc]; (4) Brit. Mus. 1960—334.

PLATE VII.

Pyrgomorphini (Parasphenina): Chirindites and Pezotagasta types.

Figs. A, B.—*Chirindites odendaali* Ramme, ♂ holotype, London. This is labelled: (1) Mt. Chirinda, Gaza Ld. Nov. Dec. 06, David Odendaal, 1908-212; (2) *Chirindites oldendaali* [sic] Ramme, Ramme det.; (3) Type [brick-red Berlin label]; (4) Holotype [red-bordered British Museum disc].

Figs. C, D.—The same, ♂ holotype of *Ch. marshalli* Ramme, London. This is labelled: (1) Nr. Chirinda Forest, Gaza Land, G. A. K. Marshall, 1908-212; (2) *Chirindites marshalli* Ramme, Ramme det.; (3) and (4) as for last.

Figs. E, F.—The same, ♂ holotype of *Ch. swynnertoni* Ramme, London. This is labelled: (1) Chirinda, Rhodesia, C. F. M. Swynnerton, 1908-212; (2) *Chirindites swynnertoni* Ramme, Ramme det.; (3) and (4) as for last.

Figs. G, H.—*Pezotagasta angolensis* (Rehn), ♂ holotype of *P. crassipes* Uvarov, London. This is labelled: (1) Angola: Villa Luso, 1-9.XI.1927, Dr. M. Burr; (2) Brit. Mus. 1928-2; (3) *Pezotagasta crassipes* g. sp. n. Type, Det. B. Uvarov 1939; (4) red-bordered Holotype disc; (5) Description published in 1953.

Figs. I, J.—The same, ♀ paratype, London. Labelled (1) — (3) as for last but dated 1.XI.1927; (4) yellow-bordered Paratype disc.

Figs. K, L.—*P. bredoi* Dirsh, ♂ paratype, London. This is labelled: (1) Mus. Congo: N. Rhodesia: Kipundu 19.I.1938, H. J. Bredo; (2) Brit. Mus. 1957-627; (3) *Pezotagasta bredoi* sp. n., V. M. Dirsh det. 1960; (4) yellow-bordered Paratype disc.

PLATE VIII.

Pyrgomorphini (Parasphenina): Parasphena types.

Figs. A, B.—*Parasphena elgonensis*, ♂ lectotype (here designated), Stockholm. This specimen measures 18 mm. in length and bears the data "Mt. Elgon, 1700-3800 m. (Lovén)", "Sjöstedt's determination and 'Typus'".

- Figs. C, D.—The same, ♀ paralectotype, Stockholm. Labelled as last, but “Allotypus”; there is also a long series of further paralectotypes of both sexes, but without type labels.
- Figs. E, F.—*P. pulchripes* (Gerstaecker), ♀ holotype from “Kilimandscharo Dr. Kersten (End December 1862), 8000”, Berlin [photo Dr. K. K. Günther].
- Figs. G, H.—*P. teitensis* Kevan, ♂ allotype, London. This is labelled: (1) Teita Hills 4500-5500 ft. Shrubby Bush, 24.XII. 45, D. K. K.; (2) Brit. Mus. 1948-256; (3) *Parasphena teitensis* Kevan, 1946; (4) yellow-bordered Paratype disc.
- Figs. I, J.—The same, ♂ holotype, London. Labelled as last except that (4) is a red-bordered Holotype disc.
- Figs. K, L.—*P. chyuluensis* Kevan, ♂ allotype, London. This is labelled: (1) Coryndon Museum Expdt. Chyulu Hills, May 38, Alt. 5400; (2) Brit. Mus. 1948-256; (3) *Parasphena chyuluensis* Kevan 1946; (4) yellow-bordered Paratype label; (5) *Parasphena nairobiensis* det. B. Uvarov, 1939.
- Figs. M, N.—The same, ♀ holotype, London. Labelled as last except that date is “Apl.”, (4) is a red-bordered Type disc, and (5) is lacking.

PLATE IX.

Pyrgomorphini (Parasphenina): Parasphena types.

- Figs. A, B.—*Parasphena meruensis meruensis* Sjöstedt, ♂ lectotype (here designated), Stockholm. This measures 16 mm. in length and bears Sjöstedt's determination label, “Typus” and the data “Meru, 3000 m.”, “Sjöstedt” and “Jan.”.
- Figs. C, D.—The same, ♀ paralectotype, Stockholm. Similarly labelled except for “Co-typus”; there is a long series of further paralectotypes in Stockholm with slight variations in the labelling, but none bears a type label; in Vienna is a male “Cotypus” with the same data and a ♀ “Cotypus” labelled “Meru nieder Ngare na Nanyuki, Sjöstedt, Jan.”; and in London are two male “Cotypi” (paralectotypes) with the same data as the lectotype (except that one lacks “Meru, 3000 m.”), a female “Cotypus” from Ngare na Nanyuki, and another from Meru Kultur[zone], 25 Dec.
- Figs. E, F.—*P. m. zeuneri* Kevan, ♂ holotype, London. This is labelled: (1) Ngorongoro, Tanganyika, 8500 ft., 25.1.47,

F. E. Zeuner; (2) *Parasphena meruensis zeuneri* n. ssp. Det. D. K. McE. Kevan, 1953, Type; (3) red-bordered Holotype disc.

Figs. G, H.—The same, ♀ allotype, London. Labelled as above, except that (3) is a yellow-bordered Allotype disc.

Figs. I, J.—*P. nairobiensis* Sjöstedt, ♂ holotype (*ex* alcohol), Stockholm. This is labelled: (1) Brit. Ostafrika: Nairobi, April (Lovén); (2) *Parasphena nairobiensis* Sj. [in Sjöstedt's hand]; (3) Typus.

Figs. K, L.—*P. naivashensis* Kevan, ♂ allotype, London. This is labelled: (1) H. J. A. Turner, Naivasha, 7.37; (2) Brit. Mus. 1948-256; (3) *Parasphena naivashensis* Kevan, 1946; (4) red-bordered Holotype disc.

Figs. M, N.—The same, ♀ holotype, London. Labelled as last except (4) is a yellow-bordered Paratype disc.

PLATE X.

Pyrgomorphini (Parasphenina): Parasphena types.

Figs. A, B.—*Parasphena kinangopa* Uvarov, ♂ holotype, Paris. This is labelled: (1) Kenya Mais Forest Kinangop; (2) Mt. Aberdare vers l'Ouest 2600 m.; (3) Mission de l'Or 9, C. Arambourg, P. A. Chapins & R. Jeannel 1932 3; (4) Uvarov's determination; (5) a red-bordered, British Museum Type disc.

Figs. C, D.—*P. keniensis keniensis* Sjöstedt, ♂ lectotype (here designated) (*ex* alcohol), Stockholm. This specimen measures 16 mm. in length and is labelled "Brit. O. Afr. Lönnberg"; it carries Sjöstedt's determination label and the word "Typus".

Figs. E, F.—The same, ♀ paralectotype, Stockholm. This specimen is also *ex* alcohol and with similar labels except that it bears the word "Cotypus"; two additional male and a female paralectotypes in Stockholm are without type labels; a further male and female paralectotype, each labelled "Cotypus" are in London; the whereabouts of the other male and female of the type series are not known.

Figs. G, H.—*P. k. rehni* Kevan, ♂ allotype, London. This is labelled: (1) van Someren, Katamayu, March 42; (2) Brit. Mus. 1953-61; (3) *Parasphena keniensis rehni* n. ssp. Det. D. K. McE. Kevan, 1953, Allotype; (4) yellow-bordered Paratype disc.

Figs. I, J.—The same, ♀ holotype, London. Labelled as last except (3) reads "Type" and (4) is a red-bordered Type disc.

Figs. K, L.—*P. ngongensis* Kevan, ♂ allotype, London. This is labelled: (1) Ngong Hills 8000 ft., 5-39; (2) Brit. Mus. 1948-256; (3) *Parasphena ngongensis* Kevan, 1946; (4) yellow-bordered Paratype disc.

Figs. M, N.—The same, ♀ holotype, London. Labelled as last except that (4) is a red-bordered Holotype disc.

PLATE XI.

Pyrgomorphini (Parasphenina): Parasphena types.

Figs. A, B.—*Parasphena mauensis mauensis* Kevan, ♀ holotype, London. This is labelled: (1) Itare R. Kericho, 6300 ft. 10-43, Hugh Copley; (2) Brit. Mus. 1948-256; (3) *Parasphena mauensis* Kevan 1946; (4) red-bordered Type disc.

Figs. C, D.—*P. m. kamasiensis* Kevan, ♂ holotype, London. This is labelled: (1) Kabarnet Dist., Baringo, 1-44 [Coryndon] Museum Staff; (2) *Parasphena kamasiensis* n. sp. D. K. McE. Kevan 1946. Type; (4) red-bordered Holotype disc [Photo: British Museum (Natural History)].

Figs. E, F.—♀ topotype, London, same data as (1) above [Photo: British Museum (Natural History)].

Figs. G, H.—*P. kaburu* Kevan, ♂ paratype, London. This is labelled: (1) Eldoret, Kenya, 6800 ft. Grass, 14.V.1946, D. K. Kevan Coll.; (2) Brit. Mus. 1948-256; (3) *Parasphena kaburu* D. K. Kevan 1946; (4) yellow-bordered Paratype disc.

Figs. I, J.—The same, ♀ holotype, London. This has similar labels to the last except that (4) is a red-bordered Holotype disc [Photo: British Museum (Natural History)].

Figs. K, L.—*P. cheranganica* Uvarov, ♀ paratype, Paris. This is labelled: (1) Kenya Chip Cherangani, Marakwet, 3500 m.; (2) Mission de l'Omo, C. Arambourg, P. A. Chapins & R. Jeannel 1932-33, together with Uvarov's determination label.

Figs. M, N.—The same, ♂ holotype, Paris. Labelled as last and with a red-bordered British Museum Type disc.

PLATE XII.

Pyrgomorphini (Parasphenina): Parasphenula types.

Figs. A, B.—*Parasphenula maxima* (Kevan), ♂ allotype, London. This is labelled: (1) 11 ml. N. of Marsabit, N. F. D. at

Chopa Gof, 3000-4000 ft., Kenya, 13.VI.1946, D. K. Kevan Coll. on shrubby bushes; (2) Brit. Mus. 1948-256; (3) *Parasphena maxima* Kevan 1946; (4) yellow-bordered Paratype disc.

Figs. C, D.—The same, ♀ holotype, London. This is labelled: (1) 11 ml. N. of Marsabit, N. F. D., at Chopa Gof, Kenya, 29.II.1944, D. K. Kevan Coll. on shrubby bushes among lava, 3-4000 ft.; (2) and (3) as above; (4) red-bordered Type disc.

Figs. E, F.—*P. boranensis* (Salfi), ♀ topotype, Genoa. This is *ex* alcohol and is labelled "Miss. E. Zavattari dei Borana, A. O. I. Moiale, V.1937"; its measurements and other features agree well with those of the holotype. According to Prof. M. Salfi (*in litt.*, 1968), the latter was deposited in Rome, but it cannot now be traced; this specimen should therefore be tentatively regarded as a neotype; further material of the series in Genoa, from Mega, Neghelli and Yavello (Javello), shows characters intermediate to *P. iavellensis*, which thus proves to be a synonym.

Figs. G, H.—"*P. iavellensis* (Kevan)", ♂ allotype, London. This is labelled: (1) A. F. J. Gedye, June 1941, Yavello, S. Abyssinia; (2) Brit. Mus. 1948-256; (3) *Parasphena iavellensis* Kevan 1946; (4) yellow-bordered paratype disc.

Figs. I, J.—The same, ♀ holotype, London. Labelled as last except date is May and (4) is a red-bordered Type disc.

PLATE XIII.

Pyrgomorphini (Parasphenina): Parasphenula types.

Figs. A, B.—*Parasphenula abyssinica* (Uvarov), ♂ holotype and ♀ paratype, London. These specimens are labelled as follows: (1) Abyssinia: W. of Mt. Zuqala, Hawash River, circa 6000 ft., 29.X.1926, Dr. H. Scott; (2) In coitu; (3) Brit. Mus. 1927-127; (4) *Parasphena abyssinica*, sp. n. Type (♂), Paratype (♀), det. B. Uvarov, 1933.

Figs. C, D.—*P. montana* (Uvarov), ♂ holotype, London. This specimen is labelled: (1) Abyssinia, Mt. Chillálo, moorland circa 10,000 ft., 22.XI.1926, Dr. H. Scott; (2) Froms hort [*sic*] turf dotted with bush heath; (3) Box 111; (4) Brit. Mus. 1927-127; (5) *Parasphena montana* sp. n. Type, Det. B. Uvarov, 1933; (6) red-bordered Type disc.

- Figs. E, F.—The same, ♀ paratype, London. Labelled as last, but (5) reads "Paratype" and (6) is a yellow-bordered Paratype disc.
- Figs. G, H.—*P. tewfiki* (Uvarov), ♂ paratype, *ex* Cairo, at present in most senior author's collection, Lyman Entomological Museum. This bears the following labels: (1) Yemen: Egyptian University Coll. M. Tewfik [on blue]; (2) Top of G[ebel] Nabi, Sho'eib, 16.6.36; (3) *Parasphenatewfiki*, sp. n. Paratype Det. B. Uvarov, 1937 [specimen measures 17 mm. in length; holotype from same locality (Cairo) is 18 mm.].
- Figs. I, J.—The same, ♀ paratype [as above]. This is labelled: (1) as above; (2) W[adi] el-Qaria (G. el — N., Sho'eib, 16.6.36); (3) as above [specimen measures 24.2 mm. in length].
- Figs. K, L.—The same, ♀ paratype, London. Labelled as last with additional label "Brit. Mus. 1937-452", and with a yellow-bordered Paratype disc beside it. One further male paratype from the type locality and two female paratypes from Wadi el-Qaria are in London; the remainder of the type series is in Cairo. [Photos A-F, K, L, by courtesy of British Museum (Natural History)].

PLATE XIV.

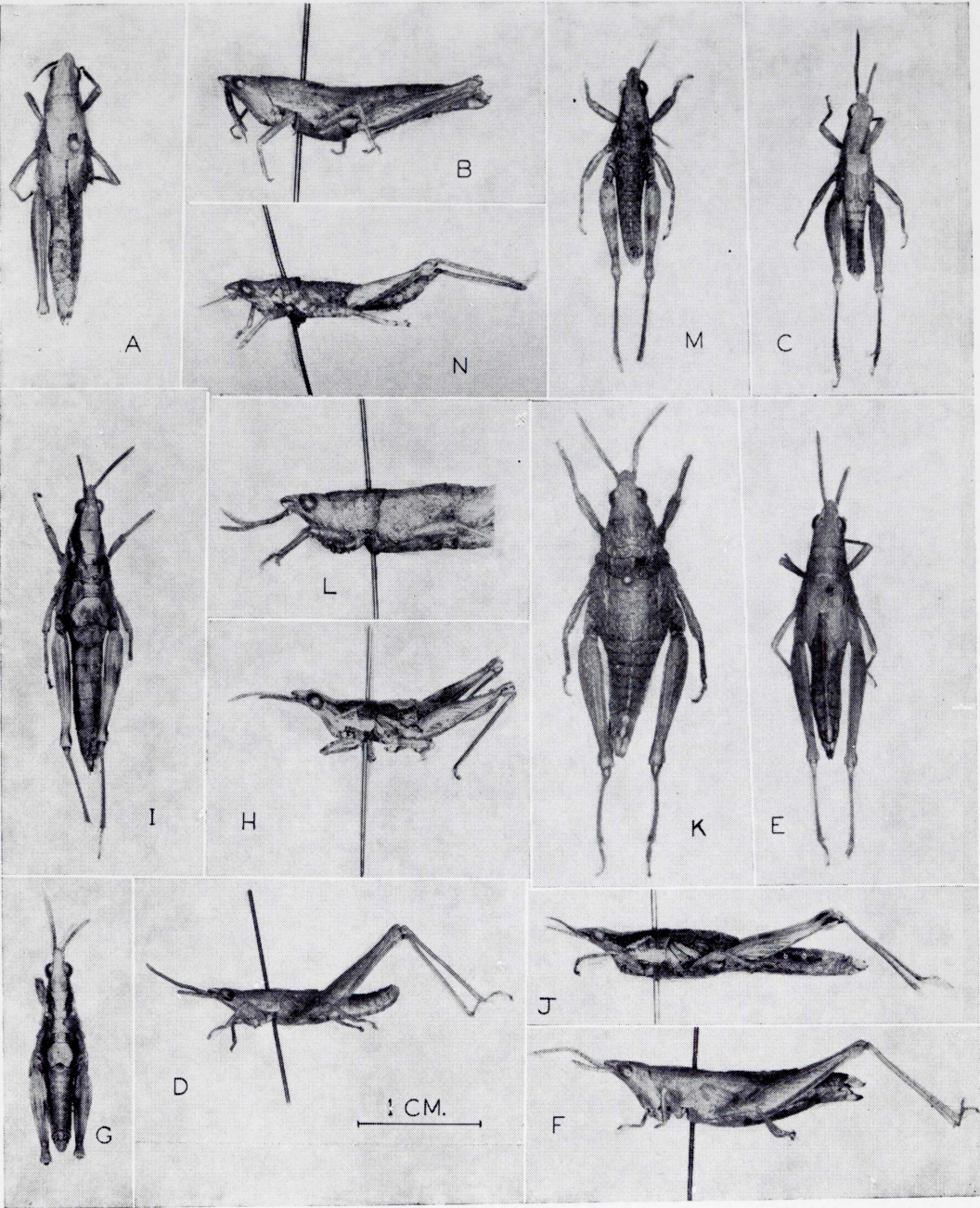
Pyrgomorphini (*Parasphenina* and *Geloidina*): *Parasphenula*, *Afrosphenella* and *Geloides* types.

- Figs. A, B.—*Parasphenula yemenita* (Uvarov), ♀ paratype, London. This is labelled: (1) Arabien, Yemen, Sanaa, 8.1931, Dr. C. Rathjens leg. Eng. No. 55. 1932; (2) Brit. Mus. 1934-96; (3) *Parasphenatewfiki* sp. n. Paratype, Det. B. Uvarov, 1935; (4) yellow-bordered Paratype disc [Photo: British Museum (Natural History)]. The holotype is in Hamburg.
- Figs. C, D.—*Afrosphenella senecionicola* (Key), ♂ holotype, London. This is labelled: (1) K. H. L. Key, near Hermanns, Cape Province, Jan. 1931; (2) Brit. Mus. 1936-5; (3) *Pyrgomorphella senecionicola* Key, Type, Det. Key 1936; (4) red-bordered Type disc.
- Figs. E, F.—The same, ♀ allotype, London. Labelled as last except (3) reads "Allotype" and (4) is a yellow-bordered Paratype disc.
- Figs. G, H.—*A. capensis* (Key), ♂ holotype, London. This is labelled: (1) K. H. L. Key, Cape flats, Cape Province, Dec.

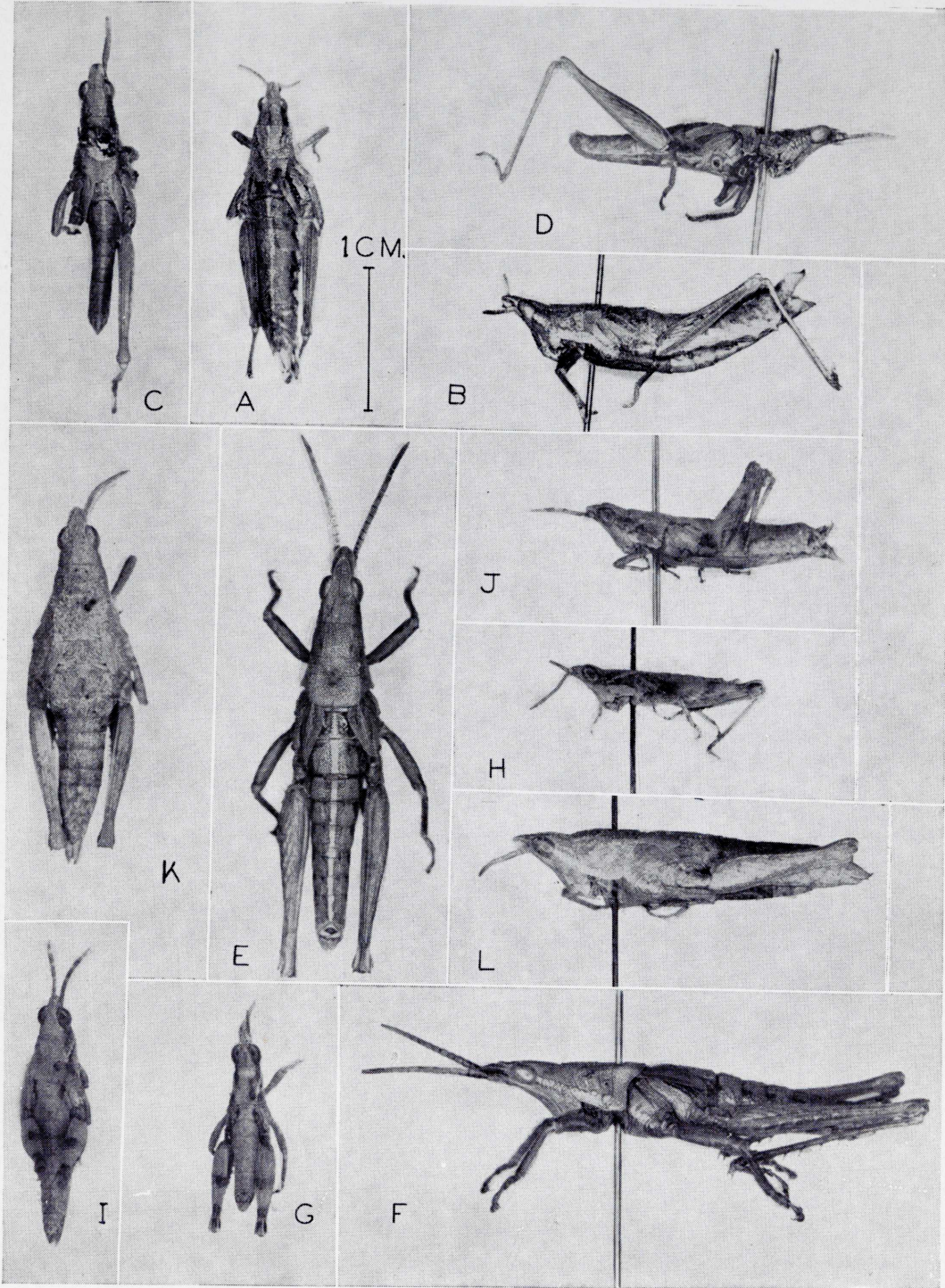
1930; (2) Brit. Mus. 1936-5; (3) *Pyrgomorphella capensis* Key, Type, Det. Key 1936.

Figs. I, J.—The same, ♀ allotype, London. Labelled as last, except (3) reads "Allotype" and (4) is a yellow-bordered Paratype disc.

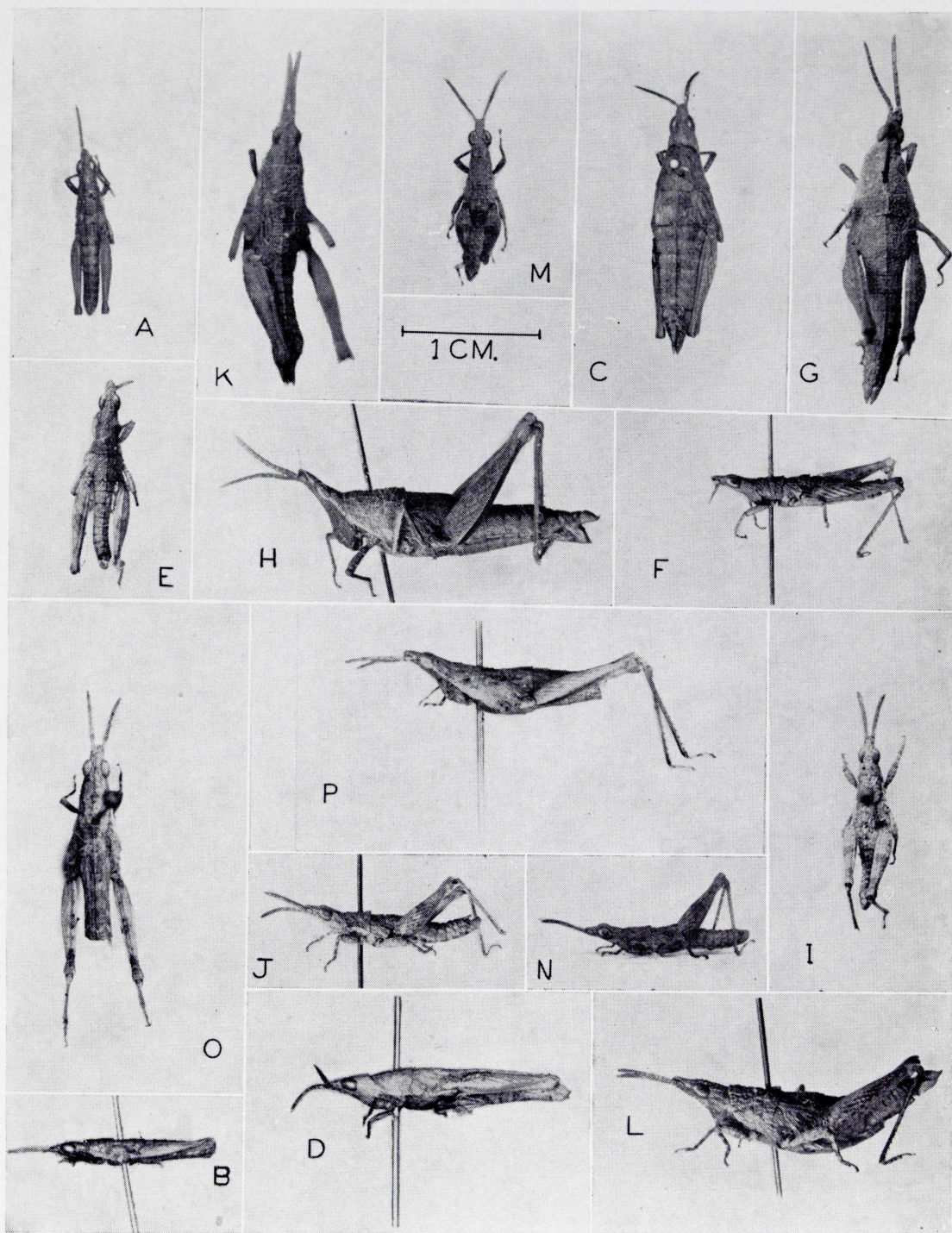
Figs. K, L.—*Geloiodes cavifrons* Chopard, ♀ holotype, Paris. This is labelled: (1) Museum Paris: São Tomé, 1500 m. Diego Vaz Monte das Quinas, P. Viette, 15.VI.56; (2) *Geloiodes cavifrons* Chop. Type; (3) Type.



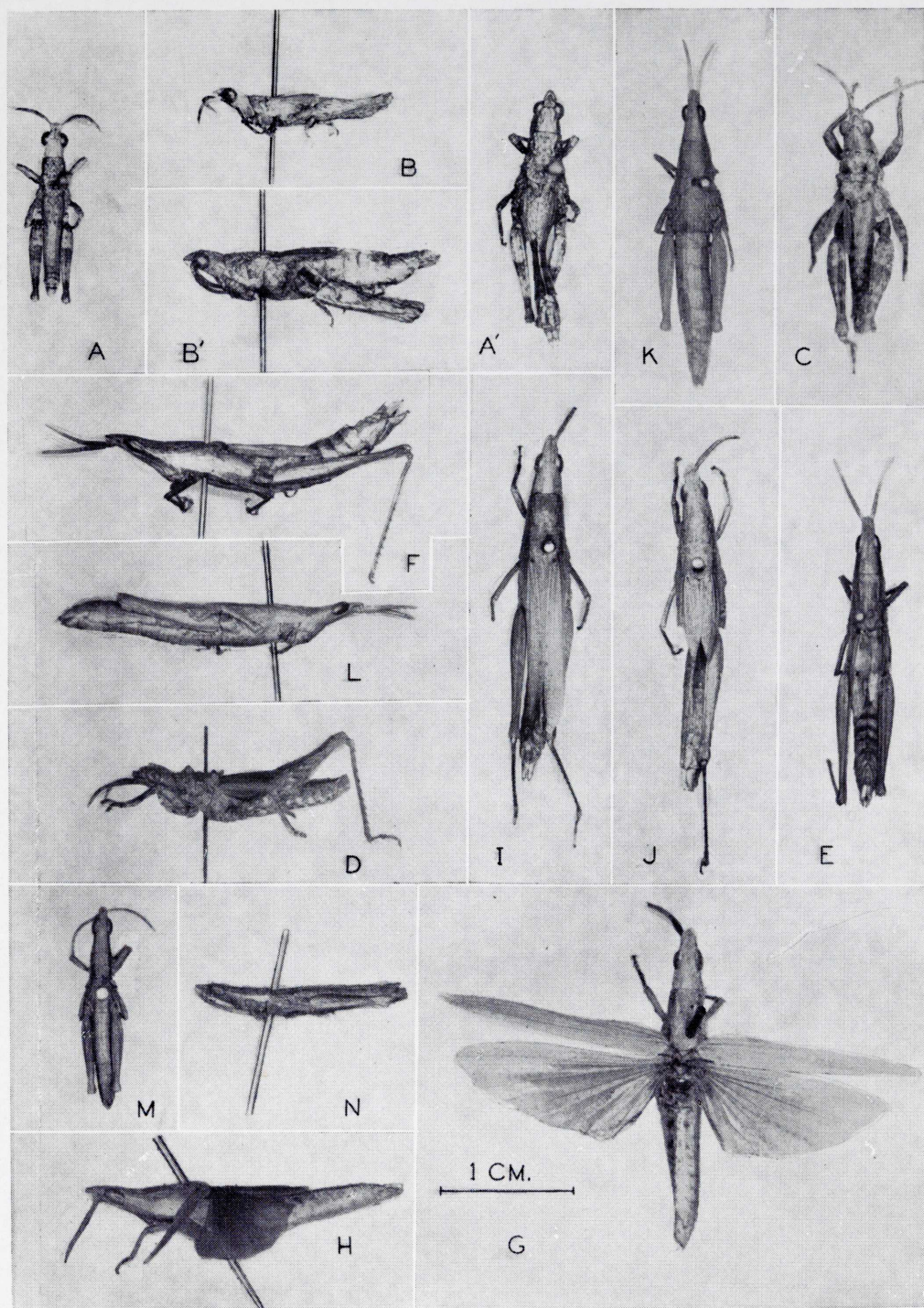
D. KEITH McE. KEVAN, SYED S. AKBAR and YU-CHENG CHANG: The concealed copulatory structures of *Pyrgomorphidae*.



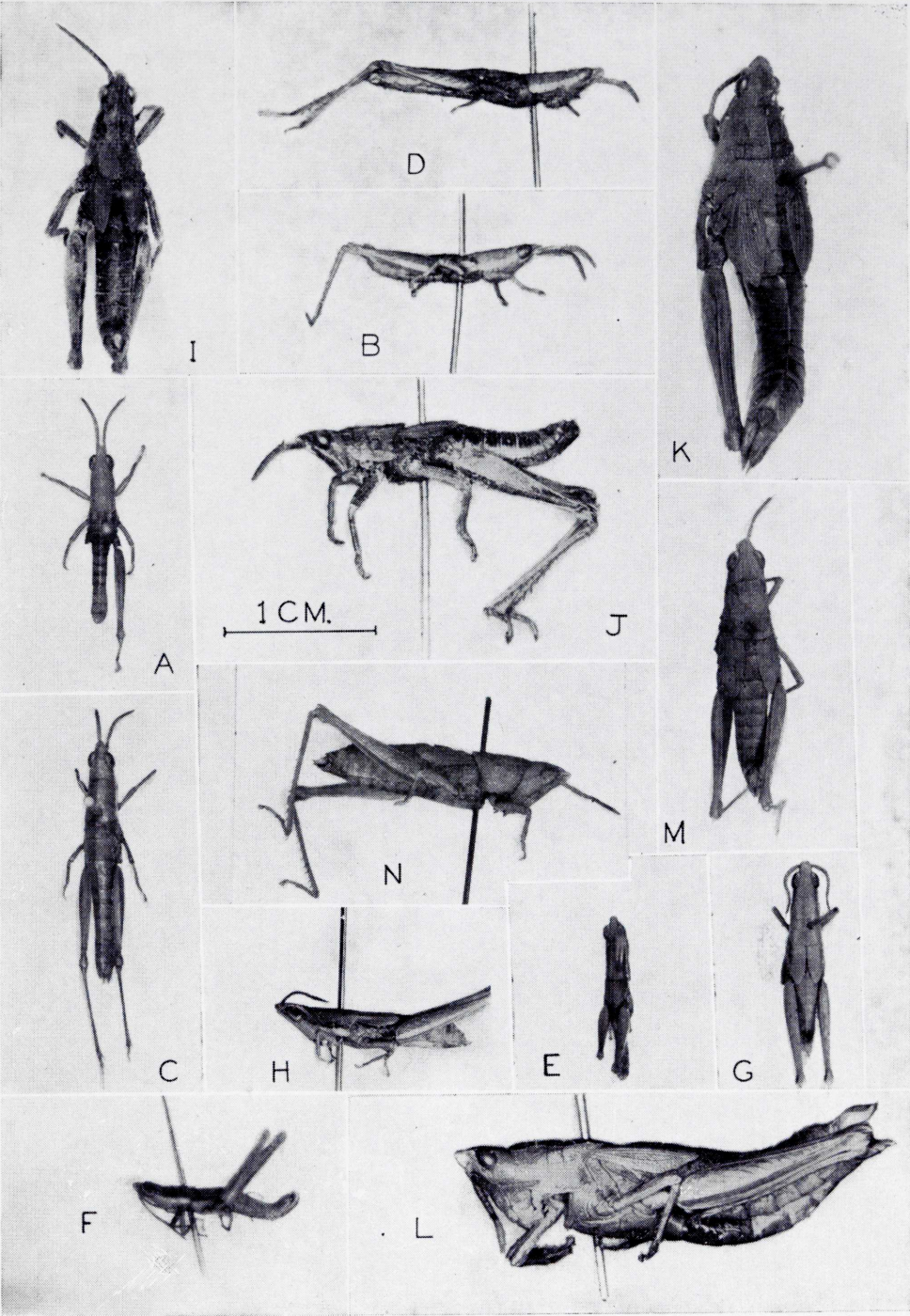
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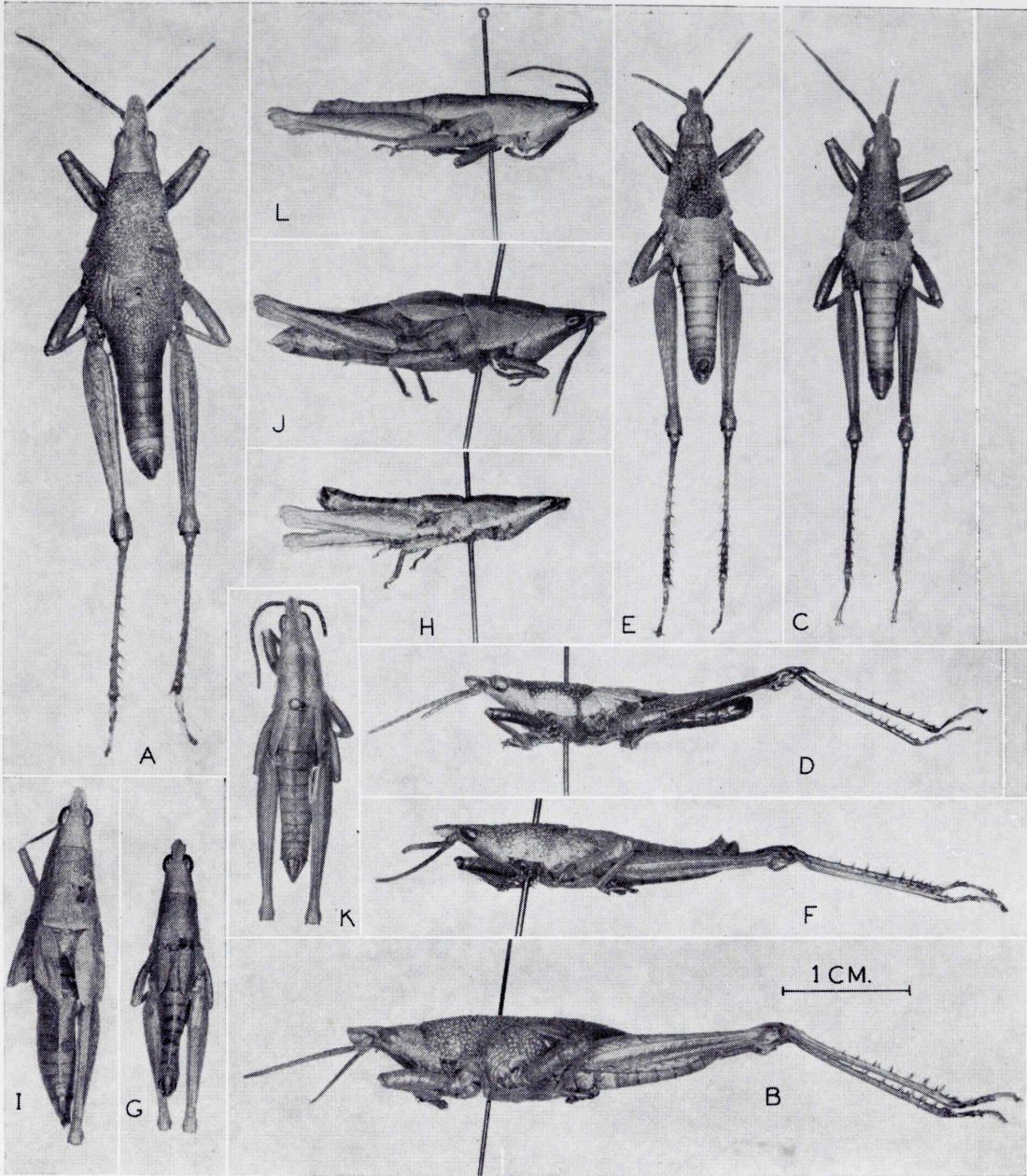
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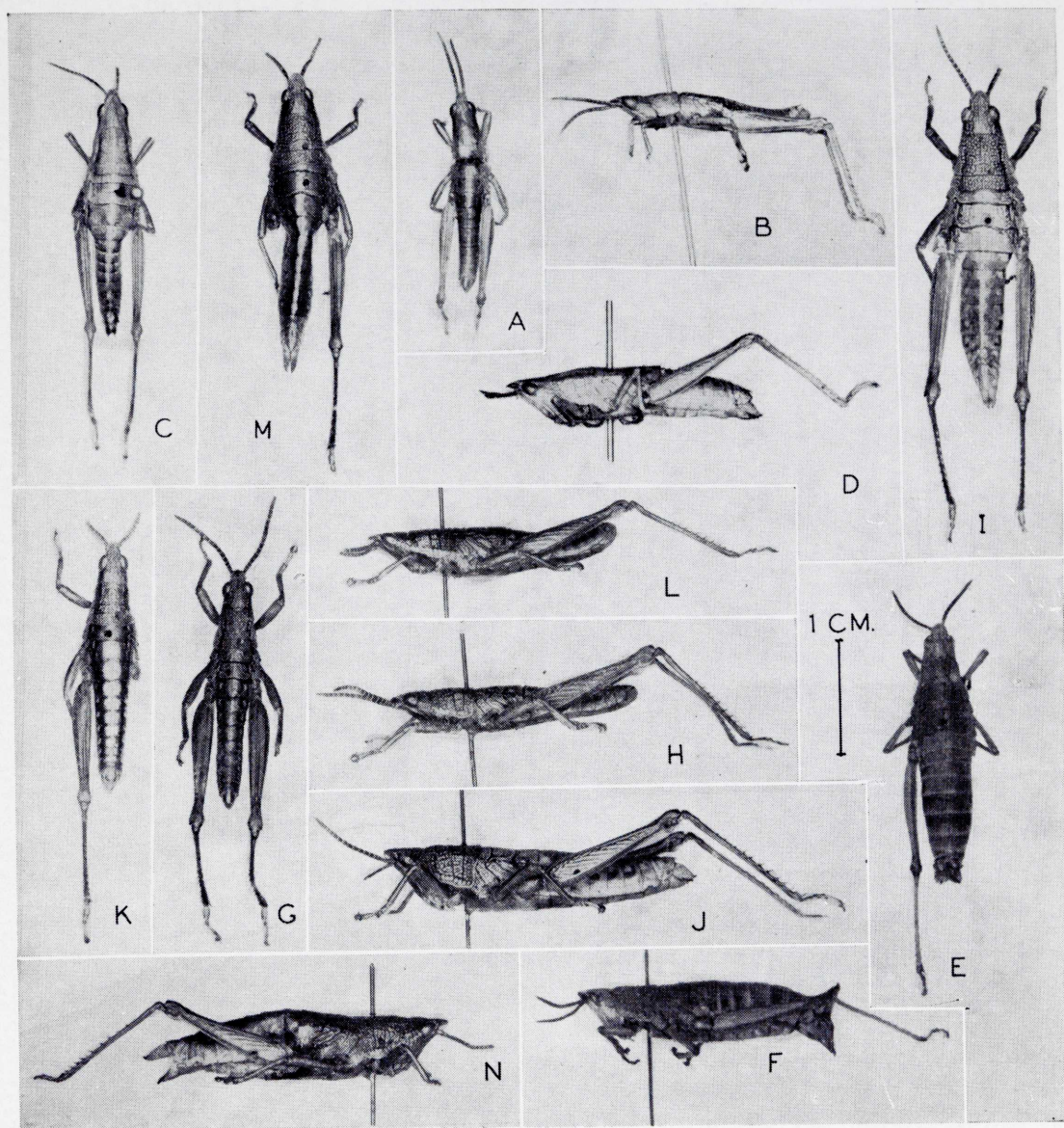
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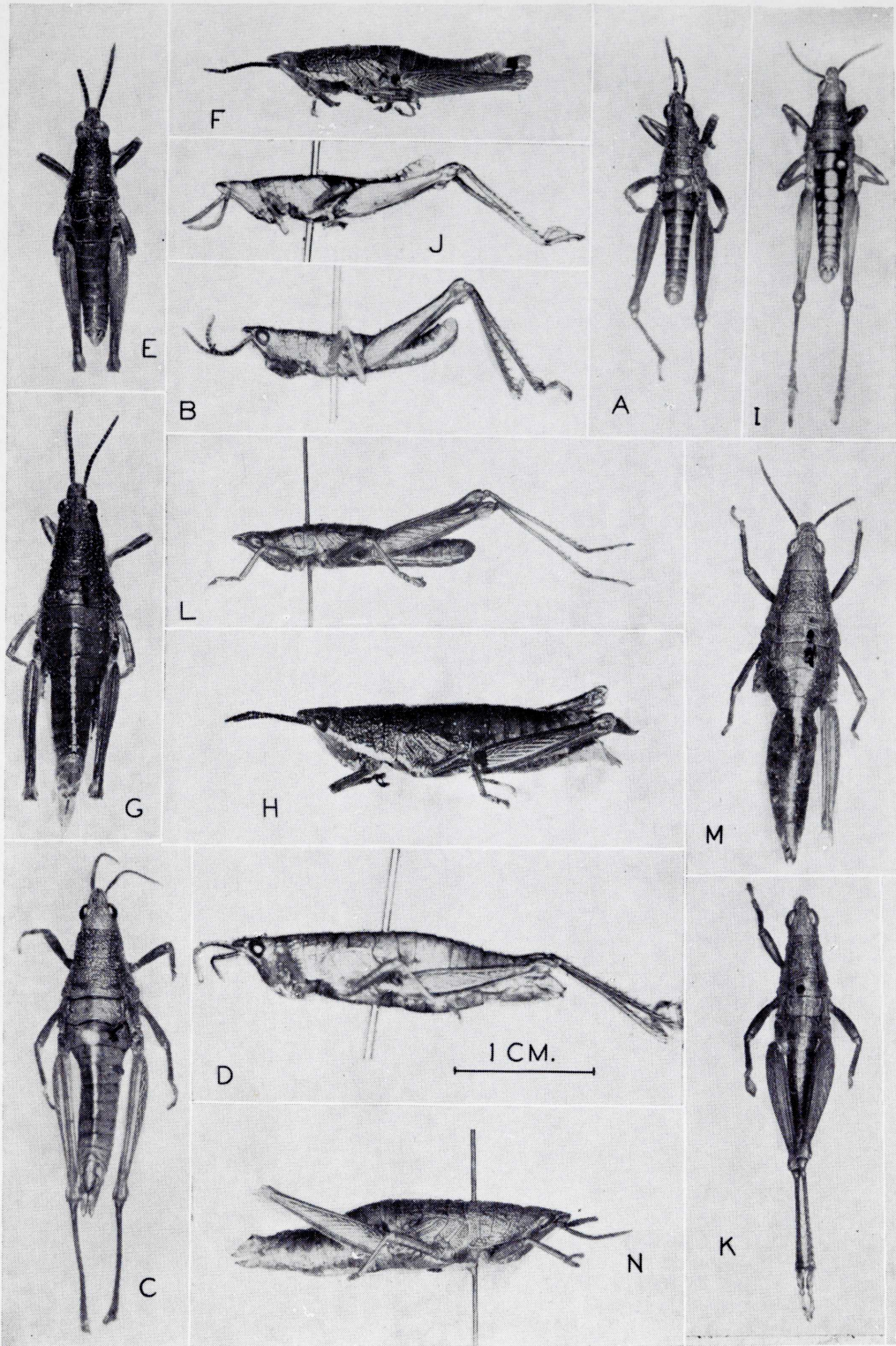
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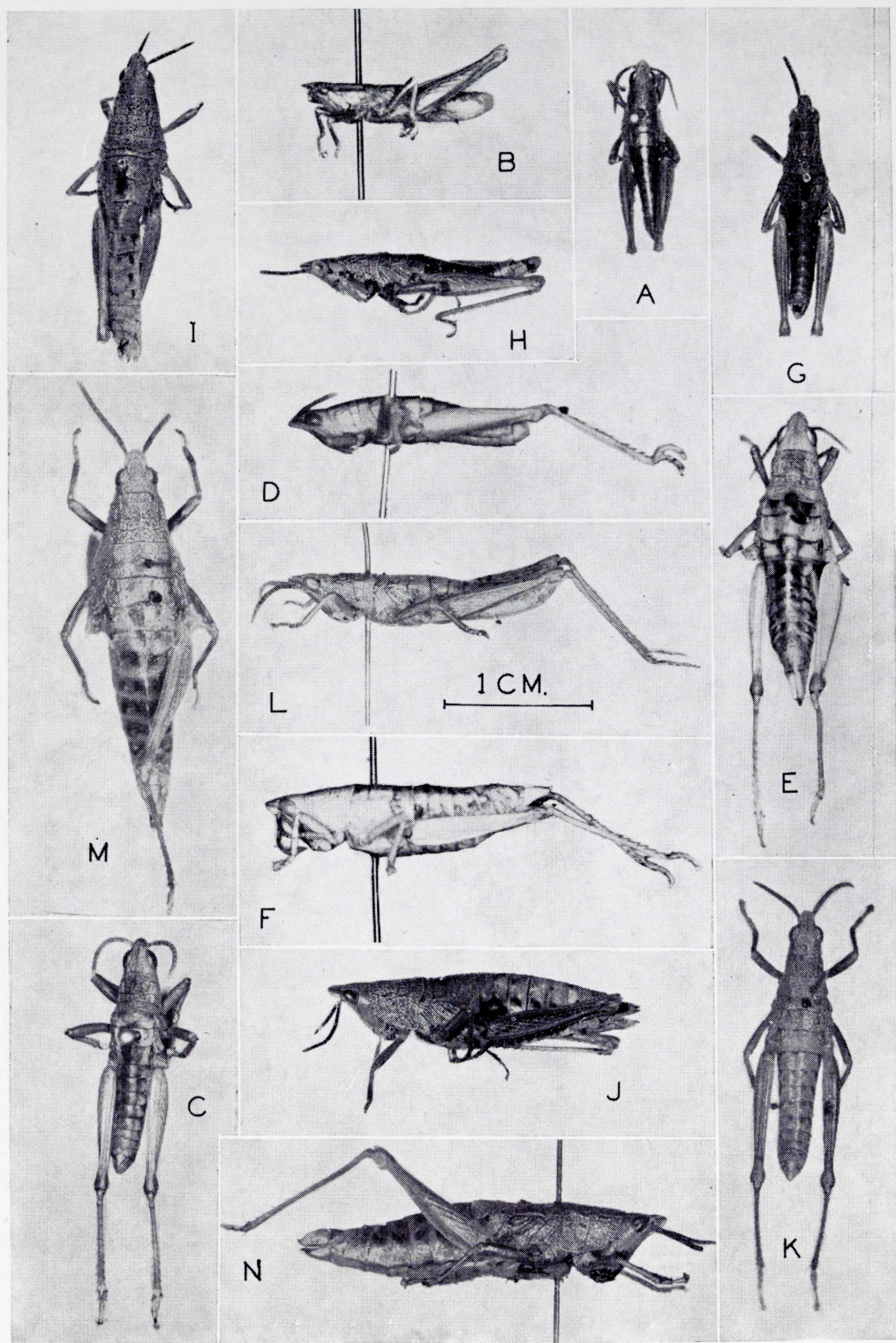
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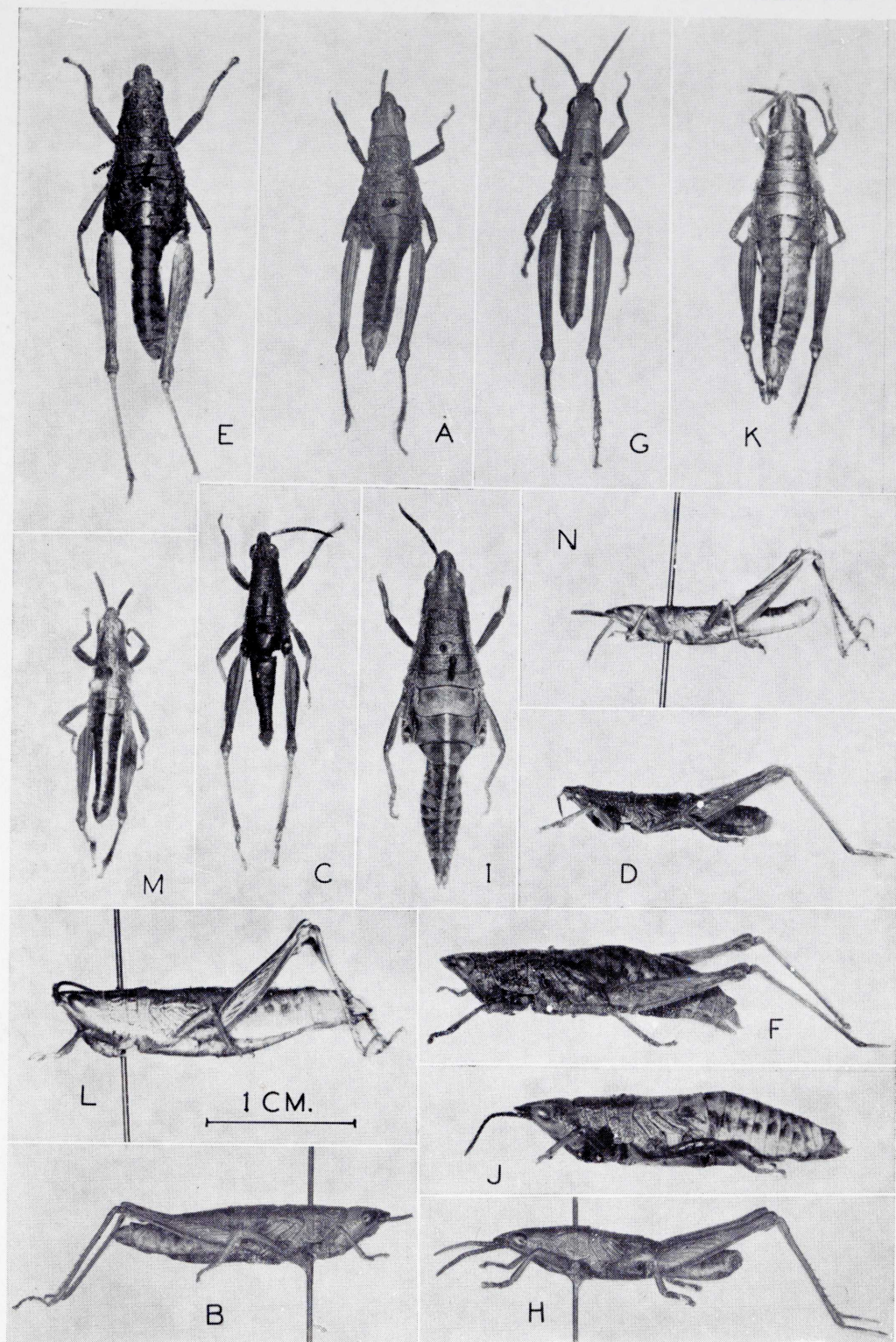
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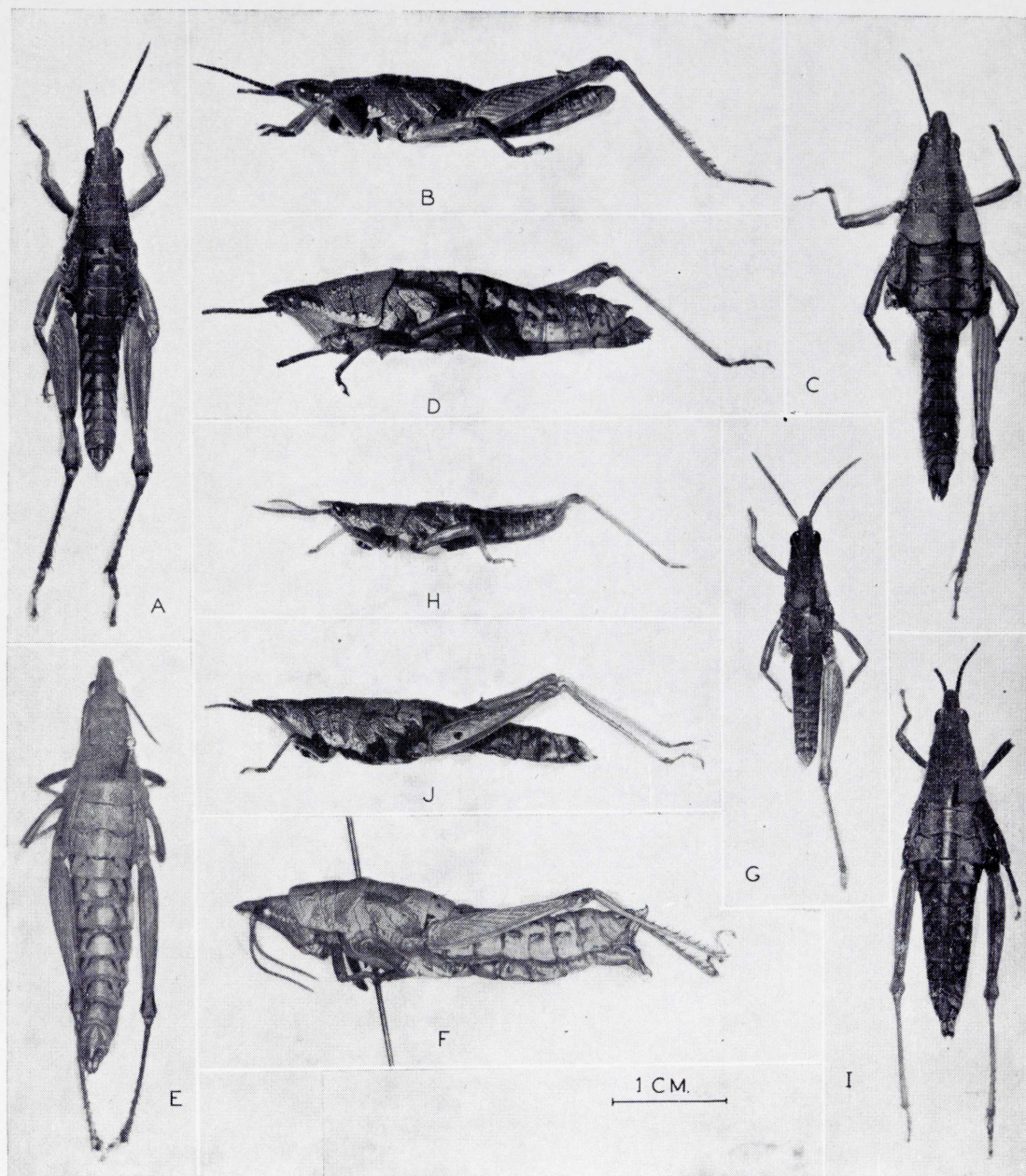
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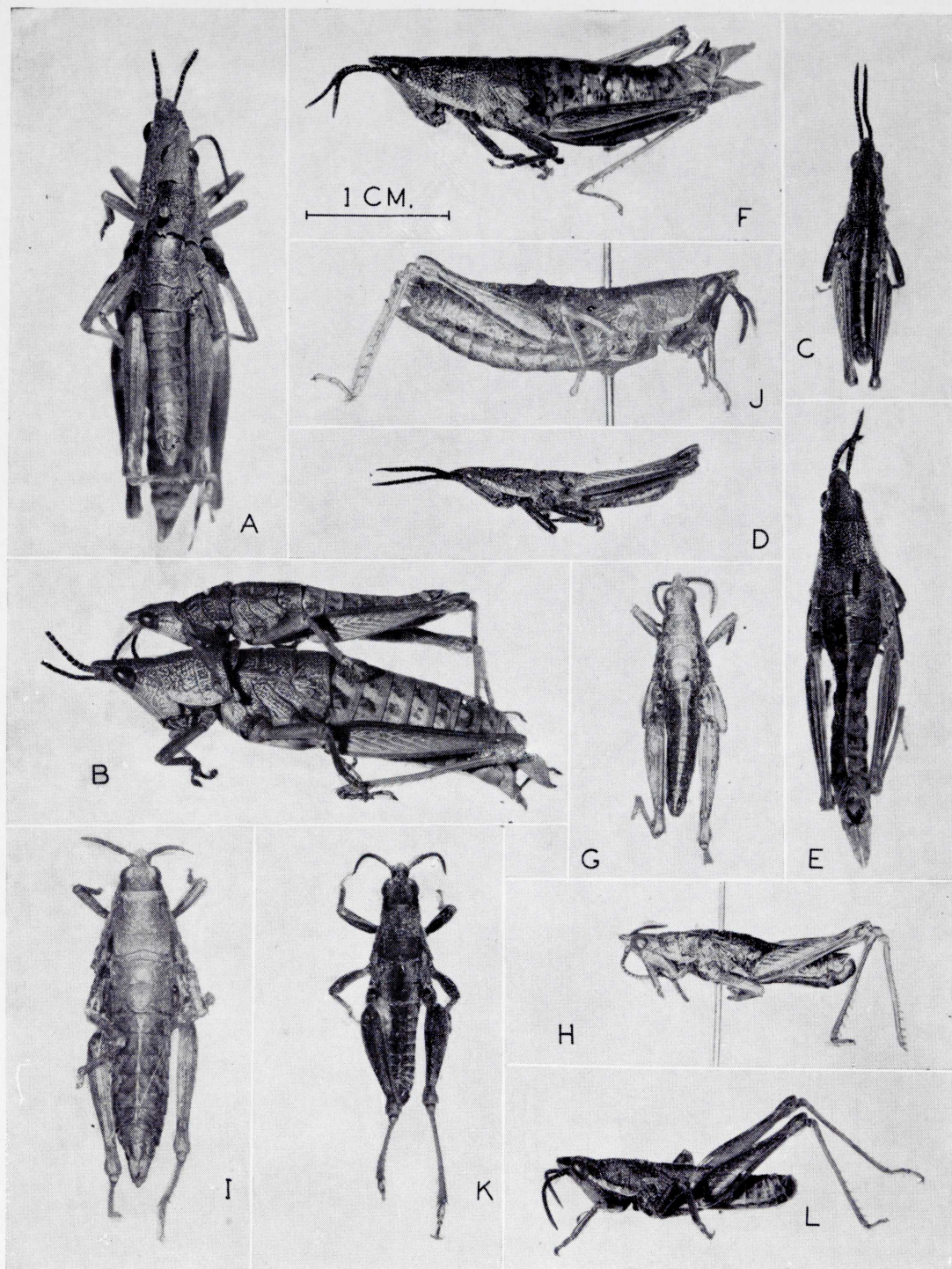
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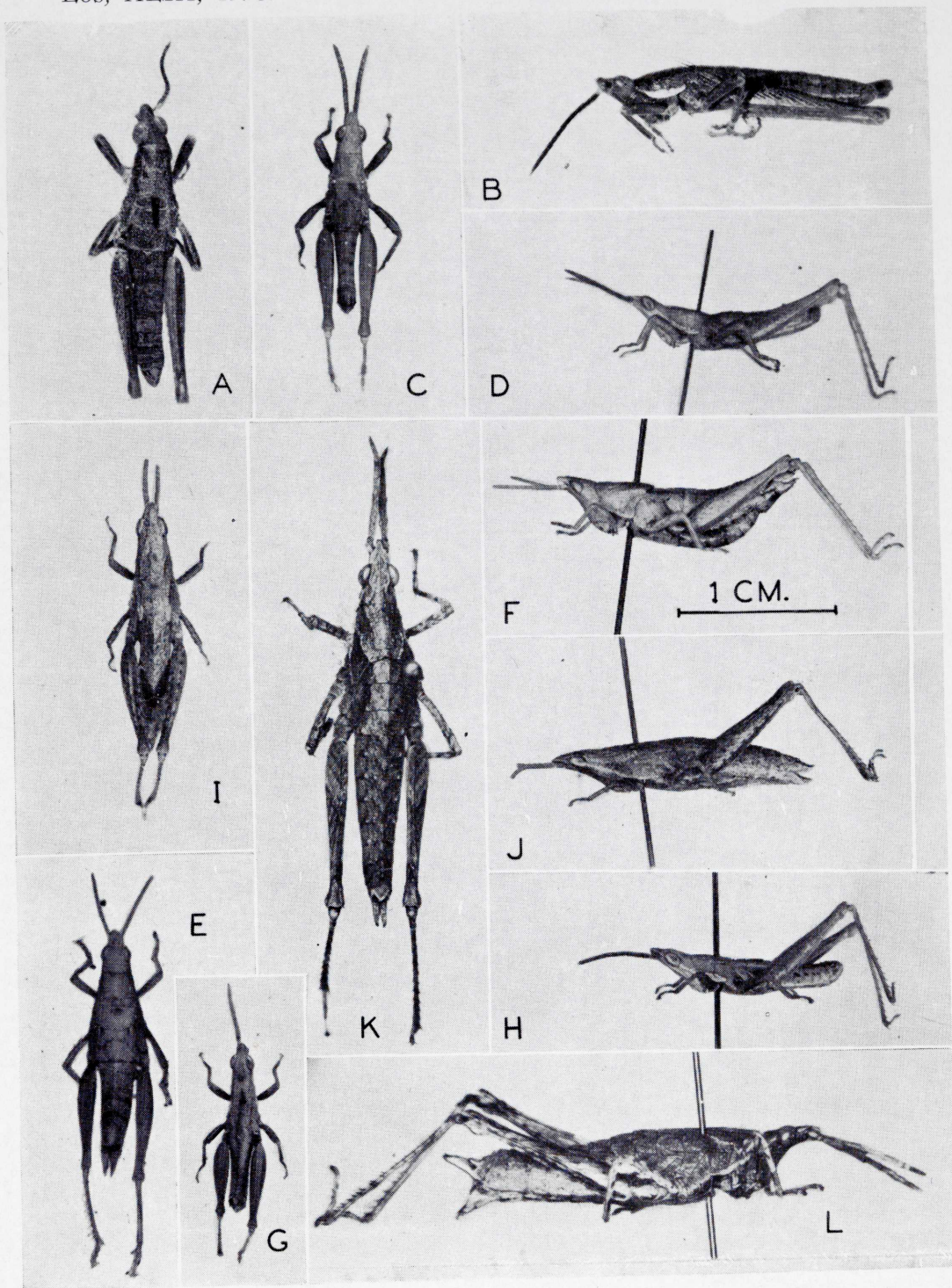
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